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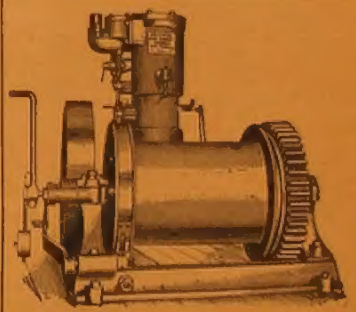

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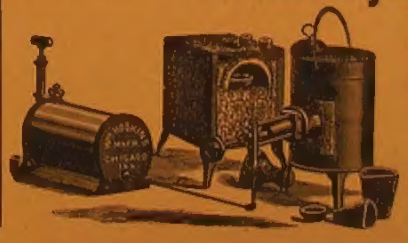

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VOL. XXII. JANUARY 1, 1900. No. 7

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TABLE OF CONTENTS.

MINERAL PRODUCTION IN 1899.

It goes without saying that the extraordinary expansion in general business, witnessed in the year just closed, characterized the mining industry in a marked degree. The discovery in recent years of rich and extended mineral deposits of various important kinds, the invention and perfection in the same period of wonderfully effective machinery, and the alluring advances in mineral values in recent months, have all conspired to render the year 1899 unprecedentedly conspicuous in the annals of the mining world. Final figures, of course, cannot now be given, but enough is known already to show the main facts.

To begin with *Iron* (as the uppermost topic in most minds as regards unparalleled prices and production), it is hard to write in terms that will not seem extreme, and statisticians of the subject are tired of recording high-water marks. In 1894, our production of pig iron was 6,657,000 tons; in 1899, only five year later, it was more than twice as much. The latest figures of weekly production available at the moment of writing shows a production of 297,000 tons, equivalent to an annual product of 15,500,000 tons. Of course, our actual product will be less than that, because we have not throughout the year maintained this amazing pace; but the final figures will be sufficiently imposing to satisfy any one. There can be no longer any doubt that the United States is well in the van of iron-producing countries. Its supremacy is no less marked in many forms of manufactured iron, particularly in steel, of which we produced in 1899 more than ten million gross tons.

Coal: The marvelous activity of almost all lines of manufacturing last year directly and immediately affected the coal trade, and the production of coal was much in excess of any previous output for the same period. Both bituminous and anthracite coal were in scant supply in the closing months of the year, notwithstanding the vigorous efforts of producers to take advantage of the unusual conditions (to make a little money was a novel experience for most coal producers) and meet the lucrative demand. In December, for example, coal famines were imminent in places as far apart as New England and Kansas in our own country, and simultaneously in various European industrial centers. In 1890, our production of coal was only about 140 million tons, while in 1898 the outcome had become about 195 millions, or the largest up to that time; but in the year just closed, the aggregate production will probably prove to be not less than 210 million tons. This is rather more than a third of the world's product, and the United States and the United Kingdom are now closely matched for the first position on the list of coal-producing countries.

Copper: Although the advancing price of copper in 1898 stimulated production greatly, and brought the aggregate output up to about 250,000 tons, the increased home and foreign demand for the metal during the last twelve months and the consequent sustained high price, have energized producers more than ever. Up to December 1st, the record of 1899 was about 22,000 tons ahead of the previous year, and it is probable that the total product of last year will prove to be not far from 275,000 tons. We are now producing about two-thirds of the world's supply of copper, and foreign consumers are largely dependent on us for their stock.

Gold: It is tolerably certain that the output of gold in 1899 exceeded that of any other year, but the outbreak of war in South Africa makes it impossible to present at this time definite and altogether authentic figures. Up to October 1, 1899, the South African yield was somewhat less than 70 million dollars, as compared with a yield for the entire year 1898 of about 78 millions. It is known that considerable gold has been mined in South Africa since the outbreak of the war, but the precise quantity is not recorded, and may never be known. Any slight deficiency in the production there has been more than made up by enlarged totals in virtually every other important gold-producing region. In our own country, for example, the mines of Colorado have surpassed themselve, and the receipts of gold at the Denver mint overtop all previous records. In Canada and Alaska the bright promises of recent years have been abundantly fulfilled. In Western Australia, the output for eleven months showed an increase in production amounting to 11 million dollars; and the increase for the year of Australasia generally is estimated at 16 millions. Everywhere, in fact, with the possible exception of South Africa, the production of gold must have reached the highest figures ever recorded, and the aggregate yield of the world, estimated at 287 millions in 1898, may be safely set down at not far from 300 millions in the last twelve months.

Silver: In the case of this metal the conditions and records of production are such as to make difficult an accurate forecast until sometime after the close of the year, and we will attempt at this time merely to indicate roughly what the final and official figures are likely to show. It will be remembered that the world's production of silver in 1898 was but little greater than in 1897, having been 165 million ounces as compared with 164. In our own country, the production in 1898 somewhat surpassed that of 1897, but was distinctly below that of 1896. The tendency so noticeable of late years in Colorado to turn from silver to gold mining is also evidenced in the records of other mining centers, and it is probable that the full returns of 1899 will disclose absolute decreases in silver production in various important regions. Mexico, however, the greatest producer of silver, will more than offset these local losses in all likelihood, as the industry there is still developing fast. Authentic statistics for the later months of the year were not accessible in time for this article, but the production for the first nine months of 1899 indicated a total for the year largely in excess of any previous figures. The commercial value of the Mexican silver output in 1898 was about 73½ million dollars, and it seems safe to value the yield for 1899 at not far from 100 millions. It is hardly probable that the output elsewhere will fall off sufficiently to neutralize this gain, and it is certain that some of the other producers will show more or less gain. The aggregate product of the world, therefore, for the year just closed should exceed, rather than fall below, the figures of 1898.

CALIFORNIA'S MINERALS.

With the increased facilities for operating mines, and the improved appliances for the reduction of the ores, the productive mines are increasing their output, and when the December quota is added to the figures for the production of the precious metals in California, the increase will be appreciable.

The quicksilver mines near Cloverdale,

which have been shut down for the past twenty years or more, have been reopened. The revival of quicksilver mining in California is in itself an unmistakable indication of a more diligent search for the precious metals.

Two other features are particularly prominent just now in California mining. One is the extraordinary energy shown in the exploration of the oil measures of the State. Prospecting is being carried on now from Trinity to San Diego. New strikes are of frequent occurrence. The area of the oil fields is, furthermore, expanding. Experts who have studied the oil-bearing shales of California predict results in time equal to those in Pennsylvania.

Another feature is the encouragement which exploitation of the unworked parts of ledges previously considered to be mineralized only in the chutes or chimneys that have been stoped is receiving, through the discovery of other bodies of equal value in what has been treated in the past as barren ground. Several examples of this kind have occurred lately. These are situated at points wide apart, which proves that the phenomenon is not a local characteristic. It may be looked for as existing in the ledges of one district as well as in those of any other. The value of the discovery can scarcely be overestimated, for it has been the means of giving a new life to some mining properties which were thought to have been worked out.

GOLD-MINING PRIVILEGES AT AUCTION.

The sands of the North shores of the Sea of Okhotsk are said to be rich in gold, and the Russian Government, for the purpose of encouraging capital to engage in mining there, will hold an auction at St. Petersburg on February 27, 1900, for leasing to individuals or companies the deposits in the basins of the various rivers emptying into the Sea of Okhotsk. The leases will run for fifteen years to the bidders offering the highest payment per pood (40 pounds) of gold extracted.

YANKEE INGENUITY AGAIN.

English economists have of late found much entertainment in seeking the causes of this country's rapid commercial growth. With the rest of the world they have seen American manufacturers placing orders in markets which they had for years considered as belonging exclusively to them, and while the figures that tell of America's vast commerce have been creeping up to untold heights, they have seen their own standing still, and in some cases dropping. Sorely perplexed by these wonderful signs of the times, they have advanced many explanations, but that which is more generally given than any other, it seems, is that "ingenuity and the mechanical instinct are more widespread in America than in England." These are the words of an Englishman, Archibald P. Head, in London *Engineering*. By way of illustrating his point, Mr. Head draws a vivid comparison of American and English methods in the iron and steel industry. In America, he says, "every stage of labor is reduced to a minimum. The loading of the ore from the mines into cars, its passage through the loading docks into lake ore vessels, its removal therefrom into cars or stock piles at the receiving ports, the unloading from cars at the smelting plant, the charging into the blast furnaces, the casting of the metal into pig iron, are all performed by mechanical means, labor being reduced to a few skilled men to look after the machinery. There is a boldness and directness of purpose characterizing American inventiveness, and the same spirit will cause machinery to be thrown on the scrap heap when anything better is invented. Steel works managers sometimes say that their works should be rebuilt every ten years. In melancholy contrast to this is the tenacity with which some old-established firms in England cling to antiquated machinery on the plea that it still does good work. They ignore the fact that though actually a good machine, it may be relatively a bad one, and that to purchase a new one would be a splendid investment."

SECRETARY GAGE'S REPORT.

Mr. Gage is a banker by nature and experience. He has studied finance from the standpoint of a banker, and has a confidence in bankers not shared by the masses of the people. Bankers are not worse than other men, but like other people engage in business for the profit there is in it. This very fact precludes the idea that it is wise to commit control of the money volume to their keeping. This is one of the issues on the money question.

Mr. Secretary Gage is of the opinion that the bankers are the very people who should have the say as to what our money system shall be. He is for what he claims to be a stable currency, one that shall rest upon the gold measure, or in other words, a paper circulation that shall be redeemed in gold. Another feature he claims to favor, and it is that the volume of currency shall be equal to the needs of business. There is no disagreement as to the propositions that the money of the country shall be sound and that the volume shall be adequate.

The first question is as to soundness, and on it are differences of opinion. Intelligent men in very large numbers do not concede that soundness depends on scarcity, it depends on law that makes money legal tender by compulsion. No material has an intrinsic money value, the money qurlity being conferred by law. As to adequacy of volume, all depends upon the magnitude of trade, that is ever increasing. Divested of the bias of interest, there are none who will maintain that the money volume should be controlled by men who are controlled by the influence of personal gain.

Mr. Gage would leave this to the banks, and expresses confidence that they will take care that the public will be abundantly supplied. The demand for money varies with the seasons. Whenever the crops are to be moved the demand is vastly greater than at other times. It can hardly be expected that the banks will put out circulation equal to the demand in the most active periods, and then keep a large quantity of notes in their vaults during the less active seasons, on which they are taxed whether in active use or not. Their profits are in keeping their notes loaned to the utmost limit of safety.

The scheme as recommended by the Secretary is that ultimately and as soon as possible, the banks shall redeem their notes in gold. Their issues then will be restricted to the quantum of gold they can command, and as the quantity of gold in the country fluctuates, their note issues will fluctuate accordingly. That would be wise banking, and absolutely for the safety of the note holders. The highest duty of government is in protecting them. Besides the bankers would be justified in regulating their own circulation for the purpose of promoting their own profits. This would be both natural and reasonable.

In the exercise of this, however, the public might suffer, not only from the action of the banks in promoting their own interests, but from their inability to maintain a sufficient reserve to redeem their notes. It would be no object for banks to issue more paper than what is equal to the gold coin in their vaults. The rule has been to issue three dollars in notes to one of coin held in reserve. A greater disparity is deemed to be unsafe to the bill holder, and banks should not be permitted to transcend that rule.

The proposition to allow the banks to issue to par of their deposited bonds instead of ninety per cent is not objectionable. If Uncle Sam's credit is good for ninety per cent it is good for a hundred, and the adoption of the proposition would probably result in an increase of the money volume. The recommendation that it be permitted to establish banks of $25,000 capital in small towns is wise, as it would not only tend to enlarge the circulating volume, but it would distribute the influence of the money power, and detract from the monopoly of money centers.

So long as bank notes are guaranteed by the government on the deposit of its own bonds as collaterals, the bill holders will be safe, but bank notes are not, and cannot be made legal tender. Should the banks be unable to protect their issues by retention of the requisite quantum of gold in reserve embarrassment might be cast upon the government.

The plans advocated by the Secretary are a radical revision of our monetary system, and however wise they may be in the abstract and in the original they can have no other effect than for the time to create disturbance and confusion.

Australian Tin.

At the Queensland, Australia, tin mines, pumping machinery has not, as yet, been used in the operations; the accurate depth of deposit is largely a matter of guesswork. There are geological reasons, however, for believing that the tin crop will amply repay any well-managed mining enterprise, In the hand-working along the edge of one lead, the precious mineral had a thickness of ten feet, and carried from twenty-one to one hundred and twelve pounds of pure black tin to the load of fifteen hundred weight. As these figures are given in a government report, their authority is beyond question. It may be that Queensland may become one of the most important sources of tin snpply in the world. It is not improbable that capital and enterprise will explore and operate in this far away antipodal district, as it has in Oreat Britain and the Straits.

The right of an original locator to relocate a mining claim on which he has failed to perform the amount of assessment work, or to place an equivalent in improvements, as required by law, is an important one. This question came up before the Supreme Court of Utah, and the Court decided that an original locator may renew his location by resuming work. While the Court in this instance recognized the right of the prior locator to relocate, it should be understood that it also requires that assessment work should not only be resumed but completed, in arder to assure possession.

COAL WASHING IN WASHINGTON.

The accompanying illustration is a view taken in the coal washery of the Carbonado Coal Company at Carbonado, Washington.

This plant is equipped with two of the Jeffrey coal washing tubs, each having a capacity, under ordinary conditions, of 400 tons each in 10 hours. The coal is brought to the washer by a system of conveyors located immediately over the washers. From this conveyer system the coal is fed into the washer by means of chutes.

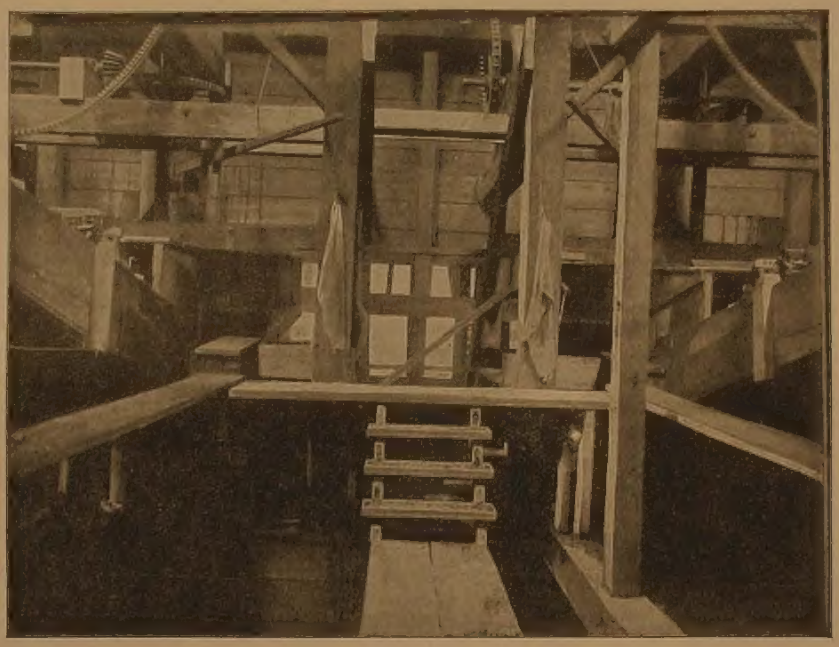
Briefly described, this washer is known as the Howe type. It is made of heavy boiler plate in the shape of a cone, at the lower end of which is a slate chamber with two valves. Immediately above the slate chamber there are four inlets, through which the water is forced into the washing tub.

In the center of this washer is a heavy shaft upon which stirring blades or paddles are fastened. These rotate, keeping the coal in a continuous state of agi ation. In operation, the coal is fed into the washing tub at the center. As this material settles in the hub it is met by the upward current of water. This, then, carries the coal or lighter products to the overflow at the top, while the refuse or heavier material sinks below, being withdrawn from time to time through the slate chambers.

In operating the slate chambers the upper valve is open and the lower valve closed; and in discharging the upper valve is closed, while the lower valve is open. The water is supplied through pumps.

By the use of this system the coal is freed from impurities, which greatly enhances the value of the coal.

The simplicity of this washer will be evident at sight, there being nothing to get out of order, which is a great point in its favor, especially when located in isolated places.



COAL WASHING IN THE STATE OF WASHINGTON WITH A HOWE TYPE WASHER.

The cost of washing by this method is as low as three cents per ton, including cost of maintenance and operating.

The manufacturers of this washer, The Jeffrey Manufacturing Company of Columbus, Ohio, will be pleased to give further information to interested parties.

Natural Coke in Sonora.

Prof. W. P. Blake, of the Territorial University, recently contributed to the Tucson *Citizen* the following comments upon the paper read at the American Institute of Mining Engineers meeting held in San Francisco by Prof. E. T. Dumble on the natural coke found in Sonora:

The coal field lies in the neighborhood of La Barranca a small town ninety-five miles northwest of the station known as Ortiz on the Sonora railway. The beds are exposed to view in the drainage basin of Calera creek, a small stream which empties into the Yaqui river opposite Toniche. The old mining town of Tarahumari is near the center of the field.

The coal is found in a series of interbedded sands and clays in the upper half of the sedimentary triassic rock formations which are sometimes called the new red sandstones. These formations have a dip or inclination to the horizon of about thirty degrees, and in a southeasterly direction. The out-cropping edges of the beds therefore trend northeasterly. But this dip and the direction of outcrop are often disturbed and changed by intruded igneous rocks by which the beds have been lifted up and broken. The beds have also been folded and faulted. The dip and direction of the coal beds have thus been modified and changed.

It is to the interjection of the igneous or volcanic rocks we appear to owe the presence of coke. Passing upward through the sedimentary beds these hot, semi-fluid, lava-like rocks occasionally spread out between the beds like great blankets and being in parallel layers with the coal beds the coal was changed to coke by losing its volatile portions. In this way the coke appears to have been formed, for in every instance a close relationship of position has been noted between the intrusive rock and the coke. "In the two principal openings the igneous rock either forms the roof, or is separated from the coke by a very thin band of slate and in both slopes there are places where the coke holds included blocks or stringers of the intrusive rock." In another opening the igneous rock forms the floor, and it sometimes fills small crevices in the coke along the line of contact. But it is possible that the change of the coal into coke is not wholly due to igneous rock for one bed of coke has been found without there being apparently any igneous rock near it.

The occurrence in coal and coke in the same bed has also been noted. In two cases the coal forms the upper bench and in the other the coke is on top as described by Prof. Dumble.

The discovery was made while searching for coal-outcrops along Calera Creek. Fragments of coke were traced up to a small bed at the mouth of El Tren. One bed, supposed to be of coal only, opened out into a body of three feet of good coke underlaid by two feet of anthracite coal. About half a mile west a body of coke was opened up which at the depth of thirty feet was eight feet thick and over ten feet at a depth of one hundred and thirty feet. Several deposits having a thickness of from two to four feet have been located.

The coke is described as dark gray in color of even texture with small pores (denser than most oven coke and very firm.) It breaks with even fracture but has in places the columnar structure of oven coke. It is an excellent fuel, burning without sparking or deflagration. It burns well in an open fire; in the forge and in the assay furnace. The ash is white.

I consider this discovery of the highest value and importance to the southwest portion of the United States and particularly to southern Arizona where fuel is so scarce and where it is so much needed industrially, metallurgically and for transportation. The rapid development of this new source of coke seems certain. It should add to the value of copper deposits and the lead and even possibly of the iron deposit of Arizona. We should be grateful to Prof. Dumble for making this important discovery. The deposits of coal in Sonora have long been known. It is now some twenty or thirty years since attention was directed to them by the late D. Boyle Blair and Jesus Ainta of Tucson, who long labored to enlist capital for the exploration and development of this promising field.

The Edward P. Allis Co. has completed the shipment of machinery for a 300-ton concentrator, to be erected by the Sulphur Mines Co. of Virginia, near Mineral City. The machinery consists of Reliance special heavy 30-in. by 14-in. rolls, Dodge crushers, automatic feeders, Hartz jigs complete, perforated metal screens, mechanically operated conveyor dryer, hydraulic sizers, Reynolds' Corless engine, etc. The plant is designed to reduce and separate iron pyrites.

Steel Production.

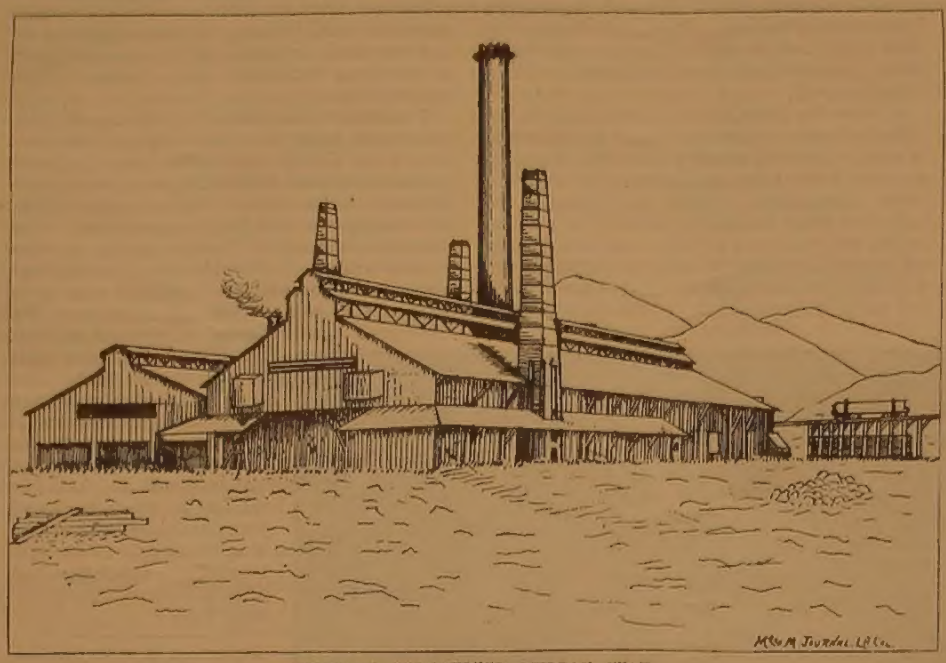
The world's production of steel last year exceeded that hitherto attained, the total being 24,127,000 tons. The United States headed the list with 8,900,000 tons, or 37 per cent of the world's out-turn. The United Kingdom furnished 4,600,000 tons; Germany, 5,700,000 tons; France, 1,400,000 tons; Russia, 1,100,000 tons; Austria-Hungary, 880,000 tons; Belgium, 650,000 tons; Sweden, 270,000 tons; Spain, 190,000 tons; and the other countries together, 480,000 tons.

There has been put upon the market by John Taylor & Co. of San Francisco a hydrocarbon burner for using coal oil or gasoline as fuel in crucible and muffle work by assayers. The advantage of this burner comes from the greater safety of coal oil which can be procured in all parts of the world.

The Robert Aitchison Perforated Metal Co. of Chicago, Ill., is busy manufacturing perforated metals for mining purposes. The company also makes a conveyor lining.

THE MINING DISTRICTS OF UTAH.

Utah has been occupied by the white man for fifty years, but during the first twenty years of its occupation very little attention was given to mining. The California and Oregon pioneers during these twenty years drove their long, weary and dusty ox trains to reach the Eldorado that then lay almost a thousand miles west of the Great Salt Lake.

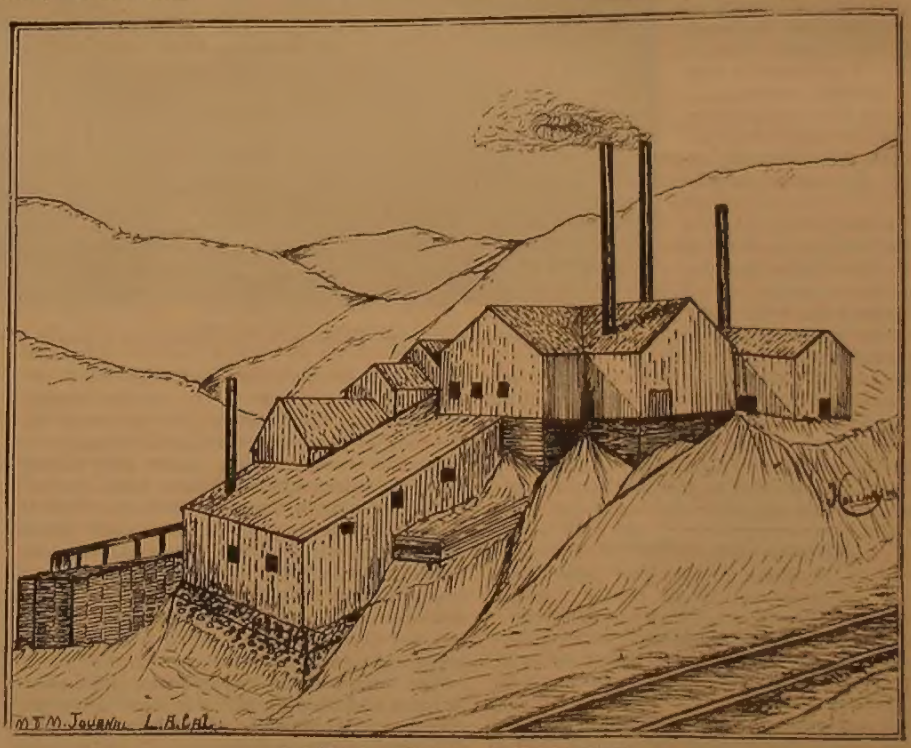


HIGHLAND BOY SMELTER, MURRAY, UTAH.

The Utah emigrants did not desire to give attention to mining. The valleys of Utah were blessed with a deep rich soil, the numerous mountain streams afforded abundant water for irrigation, and the mountain grasses gave nutritious food to countless numbers of cattle, horses, mules and sheep.

From time to time stories would go forth in the settlements that somewhere in Utah discoveries of gold, silver or lead had been made, but this discovery was kept usually very quiet. During the fifties ore was discovered near the present town of Minersville in Beaver County from which the people made bullets, unaware that it contained high values in silver. During the same decade timber cutters discovered rich float silver-lead ore in both Cottonwood and also in Bingham Canyon. These discoveries were not at that time taken advantage of, and it was not until Mining Commissioner J. Ross Brown, in 1867, gave forth his report of the Pacific Coast that the public knew of the existence of the precious metals in Utah. As the years went on and development work proved the richness of the mines of lead silver, copper and gold, capital gradually ventured into Utah with invariably the best results, and each succeeding year saw an increase in the output of the mineral wealth of the territory.

The year 1870 saw mining begún in Bingham Canyon, Little Cottonwood, Big Cottonwood and Ophir. Within ten years were added Tintic, American Fork, Camp Floyd, Dry Canyon, Silver Reef, Frisco, Deep Creek, Park City and Marysvale, and later on Gold Mountain, La Sal, Henry Mountains and Vernal, each of which have to the present day added more or less to the great annual metallic output of the country here mentioned. Fortunately there no longer remains a barrier to the easy development of the great mines of gold, silver, lead, copper, zinc, iron, manganese and antimony. Railway lines connect all the chief mining camps with Salt Lake City and every advantage of civilization now favors the most remote parts of Utah.



DALTON & LARK MILL, BINGHAM, UTAH.

With but a partial attention given to mining by the people of the state, Utah has produced up to the year 1899, values to the amount of $205,071,868.98.

About one tenth of the mountain area of Utah has been prospected by the miner, and that one-tenth has been but partially developed in its great mineral wealth.

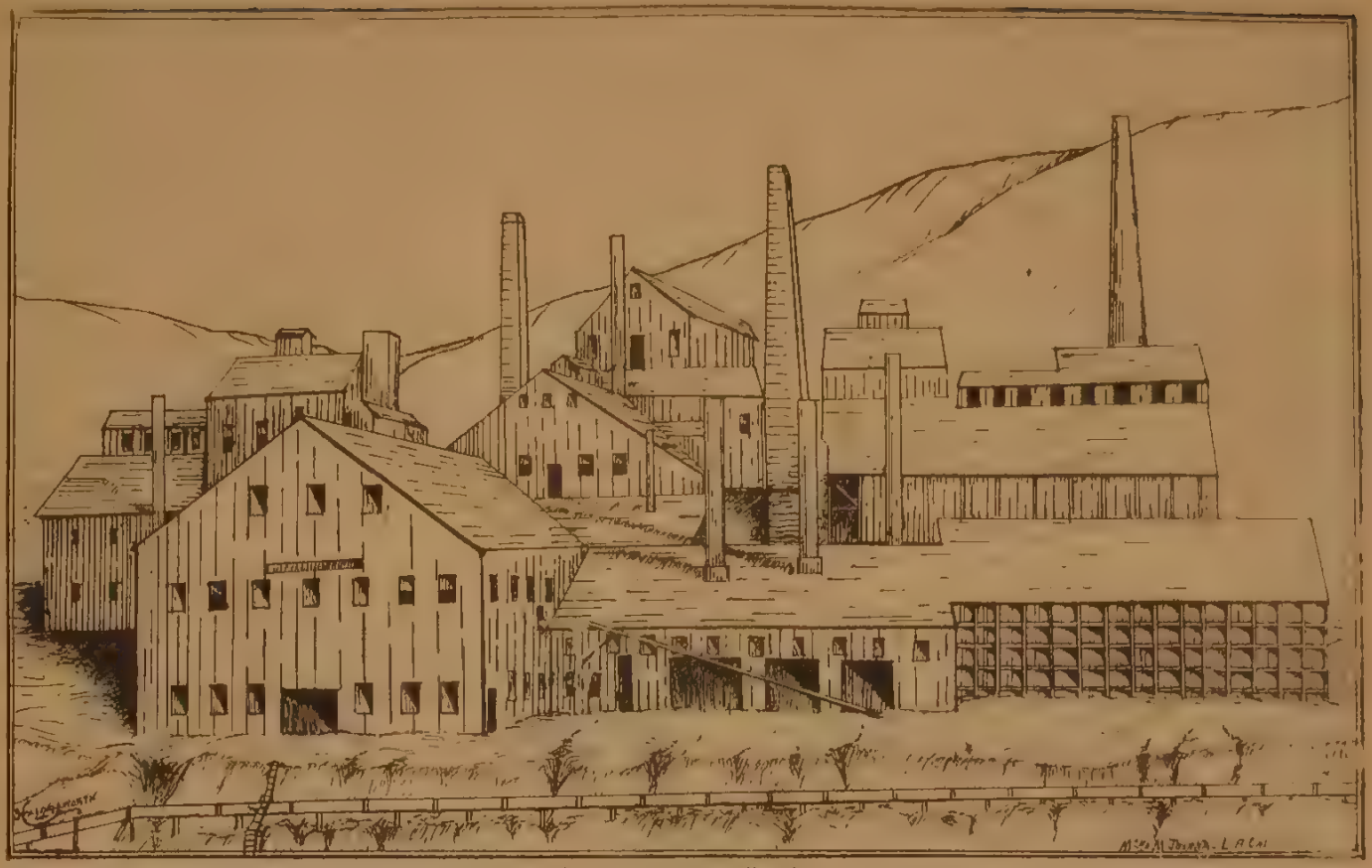
BINGHAM.

West Mountain Mining District, or as it is more frequently called, Bingham, is situated twenty-five miles southwest of Salt Lake City in the Oquirrh range of mountains—a long shallow canyon seven miles in length, pitching from a southwesterly direction and opening at its mouth into Salt Lake Valley at the point known as Jordan Plains. On either side of this long canyon and also beneath its shallow bed exists the mineral deposits that have made Bingham a household word in Utah for thirty years. The first discovery of mineral wealth in Bingham was in the early fifties when the Mormon pioneers of Salt Lake Valley began to cut down the timber that then grew so abundantly in this canyon.

In the year 1863 General Conner came into Utah with a small army to settle Indian troubles, and as his soldiers and officers were largely made up of California and Nevada miners their general encouraged them to prospect for gold and silver in every mountain into which they might ride when pursuing Indians.

The Old Jordan location was made on September 17, 1863, by these soldiers. The ore upon being assayed gave a return of silver seventy-one ounces per ton, lead fifty-six per cent and gold eleven pennyweights per ton. Such a return at once gave tone and confidence to the discovery and immediately a score of other locations were made around the first spot in which pay ore was found.

By the year 1871 the ores from the Old Jordan and Galena, also from the Telegraph, Winnamuck, Tiewaukee and a dozen unpretentious prospects were either being smelted



ONTARIO MILL, PARK CITY, UTAH.

in furnaces constructed nearby or shipped to eastern reduction works, and at that time it was the most thrifty and enterprising mining camp in Utah.

During the seventies the Old Telegraph mine, or group of mines, was sold to a French Syndicate for $3,000,000.

At Bingham indications of copper are found everywhere, but particularly in the southern part, where the great Telegraph lode crosses the area of this extensive camp. In the Highland Boy, Old Telegraph, Jordan and Commercial properties this copper body is now turning out its ores and in the Highland Boy, where its true nature is best proven, it has raised that mine to an immense property. At present the producing mines of this camp are the Brooklyn, Old Jordan, York, South Galena, Julia Dean, Highland Boy, Wasatch, Niagara, Silver Shield, Amazon, Cuba, 1889, Richmond, Winnamuck, Summit, Phœnix, Greely, Fortune, Spanish, Sampson, Montezuma, Golden Opportunity, Giant, Chief, Butterfield, Vindicator, Zelnora, Rough and Ready, Ashland, June Blossom, Erie, Silver Goblet, Levant, Northern Chief, Agnes and Dana, Old Telegraph, Mackintosh, Tiewaukee, Caledonia, Washington, Ten-forty, Neptune, Hickory, Dalton and Lark, Live Pine, Lead Mine, First Chance, Landmark, Keystone, Yampa, Black Dog, Jersey Blue, IXL, Red Wing, Storey, Liberal, Nast, Commercial and Frisco. The above do not comprise the entire list of producers of the camp but these are the ones that are the most important.

TINTIC.

Tintic mining district is situated in Juab County, in an air line about seventy-five miles west of south from Salt Lake City. The mountains in which Tintic lies are a part of the Oquirrh range which at this point simply consists of a series of bold elevations and high hills. The district contains an area of 150 square miles. There was wonderful upheaving and boiling during the bygone ages, while yet moisture and chemical action were precipitating gold, silver, lead, copper, bis-

DALY COMPANY'S MARSAC MILL, PARK CITY, UTAH

muth, arsenic and sulphur, and storing them in such great qantities where we now find them in and around Eureka, Mammoth, Silver City and Diamond, the chief camps of Tintic mining district. Eureka may be termed the west zone. and on this are situated four of the giants of Tintic; they are the Centennial-Eureka, Eureka Hill, Bullion-Beck and the Keystone or Gemini.

Over the hill to the south of Eureka is the town of Mammoth and the Mammoth mine; also the Ajax mine, and to the north of the Mammoth a large group of buildings denote the hoist and shaft house of the Grand Central group. Just south of the Ajax mine is a line of demarcation where the altered carboniferous limestone and the porphyry come together. The porphyry extends southward as the country rock and the limestone extends eastward and northward. The limestone is dark and altered from a pure limestone to a black siliceous product more than one-half of which is flinty quartz. The eastern mineral zone is in a pure carboniferous limestone, and in this are the Utah, Sioux, Uncle Sam, Humbug, Northern Spy, Carissa, Boss Tweed, Star Consolidated and other groups of old producing mines. Southward beyond Mammoth and over the hills is Silver City and in the north edge of the town, standing on a flat area, are the shaft houses and hoists of the Swansea and South Swansea mines. These two properties are on the same vein, which is in porphyry. The vein goes down almost vertical, and the values of the Swanseas run in silver and lead.

In the seventies there were mines at Silver and Diamond that were large producers of ore, but as depth was gained water was encountered and the mines were abandoned until recently. These properties were the Joe Bowers, Shoebridge Bonanza, Blue Bird and Showers Consolidated, and adjacent thereto are the Buckeye, Lulah, Silver Spar, Copper Queen, Daisy Hamilton, Tesora, Jersey, Manhattan, Homestake and Morning Glory. Extendending to the southwest on the same ore zone on which lie the Uncle Sam, Utah, Sioux, Godiva and others are the Rutter, Black Dragon, East Star, Brooklyn, King James, Antelope, Undine, Martha Washington, Indian Girl, Steeple Chase, Sunbeam Group, Problem and Home Rule.

On the same great mineral zone as that on which lie the Eureka Hill and Centennial-Eureka, is the Bullion-Beck. The discovery of this mine or rather its location, by John Beck, took place in 1870. The mine employs about 200 men, and has paid in dividends over all expenses almost $2,500,000.

Along with the above great producing mines there are around the town of Eureka most of which are producers of ore, the Eagle and Blue Bell, Richmond-Anaconda, La Reine, Rattler, Solomon's Treasure, Beecher, Montana, Victor, Sacramento, Side Hill, Alpha, Silver Coin, Gladstone, South Star, Champion, Red Bird, North West, Alabama, Tetro, Albion, Aurora, Godiva, Mountain View, Success, May Day, Independence, Uncle Ben, James G. Blaine, Stonewall Jackson, Media, Sullivan, Overman, Franklin, Augusta and a score of other very promising properties.

PARK CITY.

Like most of the great mining camps of Utah, Park City was first known in the early seventies. Its dawn was most unpretentious, and the first indications of mineral were limited to a very narrow seam in the discovery workings of the Ontario, a prospect which has since become known as a mine that turned into the world silver to the value of $34,000,000. This famous camp is situated about thirty miles from Salt Lake City in an easterly direction, on the tributary of the Weber River and the group of hills in which its mines exist is a spur of the Wasatch mountains. Although the snow falls deep during the winter season, it rarely occurs that that work of ore hauling is impeded from the mines to the mills. The Ontario mine was a producer until 1897, when it shut down, not for want of ore but becauss of the low price of silver. This property is one of the largest silver mines of the world.

MERCUR, UTAH.

The ores are assorted, the sulphurets and chloride ores being worked in the Ontario and Marsac mills at Park City, and the lead ores being shipped to the smelters at Denver, Kansas City or Salt Lake City.

The Daly mine for years a producer, paid dividends from 1887 to 1893, when it closed down its main workings on account of the price of silver and since that the work of mining in the Daly has been desultory. The lowest workings of the Daly are down 1,700 feet, and at this depth the ore bodies are stronger and richer than shown in any part of its upper workings.

Silver King, the greatest producer of the last three years at Park City, is a very large silver-lead producer that came into prominence in the early nineties and which, since 1894, has constantly paid a monthly dividend of $37,500.

Daly West is another of the very strong and promising mines of Park City, and as its name would imply it lies west of the great Daly property, with which it is connected in the ownership of stock. The ore not only runs in silver, but carries large values in gold.

Another great mine of Park City is the Anchor, which has little short of fifteen miles of shafts, tunnels, drains and winzes, the deepest shaft being down a depth of almost 1,700 feet. The development of this mine has gone forward for fifteen years.

The Crescent Mining Company owns a very large area of ground in Park City, and have done a large amount of development work that opened into some of the largest deposits of ore ever worked upon in Utah. The ore is made up of silver, lead, copper and a little gold.

The above are the properties that have made during the last twenty-five years, the name of Park City famous the world over. Yet there are other mines of lesser magnitude in Park City having very large ore bodies. These are the Creole, Massachusetts, Morgan, Woodside, Dyer group, Constellation, Denver, Bogan, Lucky Bill, Cumberland, Glencoe, Rosebud, Crown Point and Newell.

Outside of the above silver, gold and lead bearing mines of Park City, there is a very extensive copper mine known as the Valeo, which lies a few miles south of the great Ontario, and in which at present there is much interest taken, inasmuch as it is becoming a producer of large quantities of copper ore some of which runs as high as sixty per cent. in metal.

MERCUR.

Mercur was originally a silver camp. Away back in 1871 there was wild excitement over discoveries of this metal in Lewiston Canyon; very rich silver ore was found in three measures or bedding planes of the carboniferous limestones that largely make up the formation in that part of Utah. A mining district was laid out and called Camp Floyd, it being adjacent to the site of General Albert Sidney Johnston's military camp. The town of Lewiston sprung up where the town of Mercur now is in the year 1871, and continued as a silver mining camp of considerable importance until 1873, when the rich ores of silver worked out. The mine owners became discouraged and gradually the place fell into decay, and by the year 1890 there was nothing left of the once thrifty silver camp of 1871 save a single house and the foundation of an old mill, also a few abandoned prospect

holes. As there was however a vein above Lewiston townsite that many assayers said gave returns of from ten to thirty dollars per ton in gold. This property had been during the early seventies for the gold it contained, but altough a mill had been built to reduce its ore, yet not forty cents worth of gold had ever been saved in the mill workings.

In the early nineties a few men came out from the State of Nebraska, and as they desired to obtain a gold mine they were shown many. Not finding what they wanted in other camps they were told of the very fine gold vein that existed over in Camp Floyd, and at the same time they were informed that it could be purchased at a bargain. The property was visited and samples taken which assayed, true to old statements, from ten to thirty dollars per ton, and it was for sale very cheap. The purchase was speedily made, and work begun upon it. Machinery was erected, but which proved a failure. As is well known great difficulty was experienced in treating this most refractory ore, and by constant experimenting the cyanide process was adapted to the treatment since which time dividends have been paid by the Company.

Other mines were found to exist on the same measure as the Mercur. The Marion and Geyser, on the opposite side of the gulch, came in next as producers of gold bullion by the same method, then came the Sacramento, west of the Mercur one mile, and next one and one-half miles southwest the same class of ore was found in the Sunshine group, and a cyanide plant plant was erected thereon

The Golden Gate contained much siliceous and also arsenical ores of gold that were very refractory to work by the cyanide process, and it was thought that no method known could treat them profitably on account of the soapy slimy nature of one part and the arsenical nature of the other part.

The history of the purchase of this mine, the erection of Capt. J. R. De La Mar's cyanide plant, with its two sets of roasters, one to burn out the arsenic and the other to vitrify the slimy ores so that either could be acted upon by the cyanide is well known.

At present writing there are in successful operation ten or twelve gold reduction plants treating the gold ores of their respective mines by the cyanide process. These are the Geyser-Marion, Mercur, Golden Gate, La Cigale, Daisies, Sacramento, Chloride Point, Sunshine, Overland, Northern Light, and others, and the year will see the completion of four or five additional mills to work upon the lately developed new mines of the district.

(To be Continued.)

A LOS ANGELES MANUFACTURER.

Los Angeles, California, has a very enterprising manufacturer of and dealer in Optical, Mathematical and Engineering instruments, whose establishment has grown in the last few years beyond imagination.

Adolf Frese located at 126 S. Spring Street, is enjoying a reputation to be proud of as shown by the large contingent of patrons who he is able to please in respect to the quality of his goods and the prices of same. He will manufacture or repair surveying and engineering articles of all kinds, including Transits, Levels, Measuring, Rods and Tapes, Poles, Chains, Plumb-bobs, Mining, Pocket and Surveying Compasses, Abney, Locke and Plain Levels, Aneroid Altitude Barometers, Tripods, etc.

One of the views herewith shows the interior of his Factory, which is fitted up with the latest machinery for making and repairing scientific instruments, and for the grinding of any kind of lenses required.

The other is his Salesroom where a complete stock of scientifical and other instruments are exhibited. It is a marvel of neatness and gives one a confidence in the proprietor seldom encountered.

FACTORY OF ADOLF FRESE.

SALESROOM OF ADOLF FRESE.

A REPORT ON RUSSIAN GOLD.

Unusual activity in Russian gold fields is likely to follow the announcement recently made by the Okhotsk-Kamchatka expedition, on its prospecting on the northwestern shore af the Sea of Okhotsk. The results of the expedition are related in the following report, forwarded to the State Department by Mr. Pierce, the American *charge d' affaires* at St. Petersburg:

"In consequence of the information existing as to the occurrence of gold on the shore of the Sea of Okhotsk, the Ministry of Agriculture and State Domains, in accordance with the statute of the committee of the Siberian Railway, which received the Imperial sanction on the 13th of May, 1895, organized a special expedition to investigate the auriferousness of the Sea of Okhotsk, of the coast of Kamchatka, and of the Shantar Islands, where, in case of the discovery of workable gold deposits, their development by private enterprise might be expected. This expedition, organized and equipped by Mr. Bogdanovitch, M. E., continued its explorations for three years, embracing the extensive stretch of coast about the Sea of Okhotsk from Nikolaievsk, on the Amur, to Okhotsk, and the whole western shore of the Peninsula of Kamchatka. The result of the labors of the expedition justified the hopes placed upon it, as the preliminary search, combined with the detailed geological exploration of the regions traversed, proved the presence of gold in many river valleys between the left bank of the River Uda and the former port of Ayan. After the discovery of the existence of gold, subsequent prospecting was directed to the location of the auriferous beds, and the determination of the percentage of gold contained in them. More detailed prospecting, by which the total quantity of the precious metal is determined, did not form part of the object of the expedition, as requiring a more prolonged and exhaustive examination of certain localities.

"The labors of the expedition proved the undoubted importance, as regards richness in gold, of the ridge or belt of mountains lying between the Jugjur watershed (Stanovoy Range) and the elevations along the coast. The presence of gold in various river valleys, and the relation of these valleys to the said belt of mountains justify the distinguishing of six regions in the country explored, which embrace seven different river systems, presenting data encouraging further search.

(1.) *The systems of the Rivers Aldama and Ui.*—The preliminary exploration of the system of the River Aldama was carried out under unfavorable conditions in winter and spring; samples taken from the slope sides showed only the presence of gold gravels with coarse magnetite, in the main situated along the streams in the belt between Jugjur and the shore ranges. Along the River Ui, belonging in its upper course to the same belt of mountains was discovered a thin stratum of dense sand with slight signs of gold.

(2.) *The system of the River Lantar.*—Here preliminary exploration showed the presence of gold alike in the main valley of the Lantar and along its tributaries and smallest affluents—in various spots, nine in number. Prospecting was carried out in three areas:

(*a*) In the valley of the Lantar along the main stream, at a distance of 128 kilometers (79.5 miles) from Ayan, and about 53 kilometers (32.9 miles) from the mouth. Out of thirty prospecting shafts, signs of gold were met with in thirteen along the lower line, the shafts with signs of gold situated nearest to the river bed remaining unfinished. Among the shafts completed, in No. 4 was discovered a bed with an average yield of 2.6 gr. to the ton; in No. 18, with 1.12 gr.; in No. 19, with 2.29 gr. The gold found was fine and coarse, flat and bright; fineness, 897.9.

(*b*) Along the stream Durukin, falling in-

to the Lantar on the right, 5 or 6 kilometers (3.1 or 3.7 miles) above the first prospecting, three lines of prospecting shafts were made; among twenty-three of these shafts three were found to yield very good signs of gold. In four shafts was found a bed with an average yield of 0.8 to 1.4 gr., the gold being fine, even, and bright; fineness, 898.9.

(c) Along the Kaitchakit stream, a right tributary of the Lantar, 13 kilometers (8 miles below the prospecting on the middle course on the Lantar, three lines of shafts were dug. Among eighteen of these shafts, indications of gold were found in seventeen. In the lowest line, two shafts disclosed a bed with an average yield of 3.4 to 8.12 gr. per ton. From the bottom of the shaft and its cracks were taken 69.67 gr. of gold. The trench between these shafts disclosed a bed of 0.5334 meter (1.7 feet) in thickness, with an average yield of 26 gr. per ton. Shallow placer with rich pockets. Gold coarse with nuggets or fine, but dull; fineness, 850.

(3.) *The system of the River Mute.*—During the preliminary prospecting here, signs of gold were met with along the left head waters of the river, where coarse, heavy gold was found.

(4.) *The system of the River Nemui.*—Signs of gold were found in many places, both in the valley of the Nemui, and along its affluents, in the mountain belt between Jugur and the shore ranges; whereas no signs of gold could be met with along the springing from the Jugjur watershed. The gold found was in the form of large, rolled grains or small, spongy masses, with coarse magnetite or fine crystals of brown iron ore from pyrites.

(5.) *The system of the River Kyran.*—In this extensive system, geologically explored in several directions, samples direct from the slope sides and from prospecting shafts were only taken along one of the left tributaries, where good signs of gold were met with at the water level in the form of large, rolled grains.

(6.) *The system of the River Jana.*—In the system of this river, which is the left tributary of the Uda, the expedition made first discovery of gold, after ascertaining the geological and orographical isolation of the mountain belt, whose auriferous character was completely confirmed by further searching. Only in this system was the soil found to be perpetually frozen. At a depth of 4 8 meters (15.7 feet), good signs of gold were met with.

The observations of the expedition ascertained the fact that the climatic conditions of the regions explored, although somewhat severe, present no obstacles to the successful winter prospecting and subsequent working of the gold fields. The working period, however, is shorter than in the Amur region and eastern Siberia, viz., ninety days. Workmen, materials, and stores must be brought by sea.

PIERCE COUNTY MINES.

The Chamber of Commerce, at Tacoma, Washington, co-operating with the Board of Trade, have adopted a course which, if followed out, will result in great benefit to Pierce County and the State of Washington in general. About a month ago, these two bodies jointly appointed two committees to investigate different mining sections and the mineral wealth of Pierce County generally.

The reports are long and cannot be printed in one issue, but we propose publishing it in serial form through two or three issues. The first installment of the report of the committees follow:

"The undersigned, your special committee, appointed under resolution of the Chamber of Commerce and Board of Trade to visit the Carbon River and Tahoma mining districts, at the expense of the Chamber, with instructions to investigate:

"First—The mines in course of development;

"Second—To personally secure samples of the different ores and have them assayed;

"Third—To report on the improvements made at the mines;

"Fourth—To determine if, in our judgment, there was sufficient ore in sight to warrant the construction of a wagon road, for the purpose of taking in machinery and hauling out ore, and, if so, to investigate the feasibility of constructing said road from Fairfax to to the mines, and recommend what action should be taken;

"Fifth—To report the commercial advantages to be gained by our merchants and citizens generally by the development of these districts, and in our judgment the most practical way to accomplish that result.

QUARTER OF A MILLION SPENT.

"Conforming to the above instructions, your committee left Tacoma, Monday, October 6, and on Tuesday morning reached Fairfax, seven miles up the Carbon River from Carbonado. A standard gauge railroad has been completed to this point by the Western American Company. We met H. S. Huson, its manager, who showed us every attention. Here we found the nucleus of a thrifty mining town as the result of the expenditure of over a quarter of a million dollars.

"The company is preparing to ship 1,000 tons of coal per day to Tacoma, and to that end for the last two years has been driving entries by compressed air, to crosscut its twelve veins of coking coal, and has driven nearly a mile of entries.

"They have completed large coal bunkers, installed a coal-washing machine, of 1,000 tons daily capacity, and operated by electricity, and which is ready to start to work.

"They have constructed over a mile of flume, taken out of the Carbon River, which is eight feet wide and four feet deep, which terminates at their power house near the coal bunkers. This flume will generate 1,000 horsepower. They have a 250 horsepower waterwheel now operating a 250 horsepower dynamo, which in turn operates the different machinery connected with the plant, and also furnishes electric light in the mines and in the town. The electric wires are all strung, both in the mine and in Fairfax. The hauling from the mines will be done by electricity; two electric locomotives being now on the ground. By December 1st they expect to commence shipping coal.*

IS A MODEL CAMP.

"There are already some twenty comfortable houses erected by the company, which are rented to the miners for from $3 to $5 per month, all being occupied and more needed. Good office buildings and large stables make this a model camp. They have a post office and daily mail. Horace Fogg, of Tacoma, is the auditor. There are also being constructed seventy-five coke ovens; twenty-five will soon be completed. The fire brick coming by rail from Pennsylvania. The other fifty will not be completed before March, the fire brick now being afloat from England, and is not expected here until February. The foundations, however, are now in caurse of construction and the general appearance of the camp is one of bustle. More than one hundred men have been employed since early spring. A new street is soon to be graded. The coal is reported to equal the famous Connellsville and assays:

"Carbon, 66.22; volatile, 19.78; ash, 12.10; sulphur, .6; moisture, 1.30.

"Coke, 98.45; volatile, 1.60; ash, 6.95; sulphur, 96; moisture, .24.

"One thousand tons of coal a day means the employment of 350 men or a population of 2,000 people, all tributary to Tacoma.

EASY TO BUILD ROAD.

"Tuesday afternoon we continued our journey to the half-way station of the Washington Co-operative Mining Syndicate, known as Cliff house, which is four and one-half miles from Fairfax on the new trail to Surprise and Clipper Mines. This trail has been completed this Summer by the Washington Co-oparative Mining Syndicate, from Fairfax to the Surprise mine, a distance of between eight and nine miles, and the Leola Mining Company have connected trails from their several mining camps with it. This trail was located with the purpose of changing it to a wagon road or narrow-gauge railroad, and the county commissioners have had a survey run over the trail with a view of making a wagon road out of it. Captain J. E. Noel, the County Surveyor, reports that it can be transformed into a wagon road with a maximum grade of five per cent, and that it is a comparatively easy mountain road to build. Here we found a comfortable building and stable, and were well cared for by Herr Gropper and frau, who take pains to cater to any wayfarer.

"The same day we continued to Surprise Mine, which is the end of the trail on which the Washington Co-operative Mining Syndicate have expended over $2000, and to our surprise found a spiendid camp of large, well constructed buildings, made of large logs, with good windows and floors and shake roofs; made to withstand any pressure that would be caused by heavy falls of snow. There is a large kitchen and dining room with a steel range and large hot water tank for the use of the miners when they come off the shift; also a complete outfit for the range and dining room to accommodate fifteen men. There is a bunk house about twenty feet from the kitchen, and connected with it by a large shed for the storage of fuel. The bunk house is furnished with tables and chairs from Tacoma, also with the daily papers of Tacoma, and late magazines, together with chess, checkers and other games for the amusement of the men when off duty.

MAKING THEIR FURNITURE.

"The floors and casings are made from Alaska cedar, which grows right there and is a very valuable wood for the manufacture of furniture, as it is very fine grained and takes on a beautiful polish. There is a comfortable office building furnished with a spring bed, hair mattress, bedding, mats, china wash bowl and pitcher and rocking chairs, from Holmes & Bull. This is where Captain Cutley, the Superintendent, lives.

"There is a blacksmith shop completely furnished with forge, anvil, vise and sharpening drills and other work necessary for a mine. They use the Fairfax coal and like it better than Bossburg.

"There is a stable thirty feet long and

*A fire in the mines recently, precludes the possibility of shipping coal for some time:—ASSOCIATE EDITOR.

twelve feet wide, nicely floored, with feed boxes and hay racks. There is a powder house and outhouses, ore sheds, and sheds from mouth of mine to the ore dumps, so that snow will be no impediment to work during the winter.

CREW OF THE MINE.

"The crew consists of Captain D. E. Gulley, Jacob Sanders, Charles A. Goble, J. B. Gropper, A. B. Gropper, W. E. Emerson and Carl Gropper.

"After resting and dining we went into the entry of the Surprise Mine, which is forty feet long and six feet wide, and which is being double-shifted. We carefully examined the face of the entry and measured twenty inches solid ore next to the foot wall, then a stringer of mineralized vein matter thirty inches wide, then eight inches of solid chalcopyrite ore, the balance of the vein being vein matter lightly mineralized. We selected samples from a shot put in for our benefit, with the following results:

"Gold, .02 oz.; silver, 6.80 oz.; copper, 24.80 per cent.

"Total value, $96.24 per ton.

PROTECTING THE ASSAYS.

"Referring to the assay herewith submitted we wish to state that we have selected the samples as average of the veins represented, and kept them in our possession until delivered to the assayer, each sample being designated by a number only. The assays were made under our special supervision and the assay sheets returned to us designated by the numbers only. Then we filled in the names of the mines they were taken from.

"We examined the work done on four different veins on this property. The Gulley vein is six feet wide, with twenty-five inches solid ore, which surely has the appearance of uncovering valuable deposits. The veins worked have a general east and west strike, while there is a cross vein exposed having twenty-five inches of ore and having a general north and south strike. The general dip of the vein is about 70 degrees.

"A blast was put in the outcrop of Surprise vein in Ship Lake Creek, which is the outlet of Ship Lake, and would furnish water power for compressed air drills, for our benefit, which threw out fourteen inches solid ore, a sample of which we took, and which assayed:

"Gold," .03 of an ounce; silver, 9.60 ounces; copper, 22.50 per cent.

"Total value, $89.81 per ton.

(To be Continued.)

DIFFERENCE IN MAGNETIC NEEDLES.

BY C. LOUIS BERGER.

(Continued from our issue of December 15, 1899.)

A surveyor's compass is ordinarily graduated to single degrees, and a fine instrument is seldom divided to read to less than one-half degree directly or from six to ten minutes by estimation; therefore it is useless to try to arrive at results closer than these. A needle will serve its purpose well if the two principal axes coincide within the degree of accuracy obtainable with its length and with the compass as a whole.

The following question may now properly present itself: What is the best form for a magnetic needle for the surveyor in order that it shall be so nearly free from errors due to the above causes as not to require reversion and yet to come within the degree of accuracy obtainable in practice? If now we have recourse to Fig. 1 and such modifications of the shape there shown as is delineated in Fig. 2, 3 and 4, we shall see that since the greatest superficial area lies in the azimuthal plane, deviations of the two axes cannot be infrequent, and, therefore, these shapes are not well adapted for surveying instruments. Fig. 4, in particular, presents the curious combination of a large surface at the ends and a small one at the hub. This increased spread of surface by the arrow-shaped ends renders the needle especially liable to this defect without so much as compensating for it in greater magnetic intensity as was probably the sup position since the arms connecting it with the central hub are quite narrow and limit the magnetic intensity. This faulty design is probably based on the supposition that since in a well hardened and well constructed needle the magnetic intensity is greatest at or near the extreme ends, gradually weakening towards the center where it becomes quite indifferent, that if the ends are made big the needle will the more readily assume the magnetic direction.

On the other hand, the edge bar needle as shown in Fig. 7, with its greatest superficial area in the vertical plane, reduces the chances of a non-coincidence of the two principal axes in the azimuthal plane to a minimum. In order to add strength and stability to this needle it is made thicker at the middle than at the ends, which are quite thin.

If in the manufacture of a needle of this form the arms are bent so as to be symmetrical to the axis passing through the center of the needle cap and at right angles to the line connecting the ends of the needle, as shown in the exaggerated diagram, Fig. 8, the magnetic axis will be contained in a plane parallel to the vertical plane passing through the ends of the needle and a little removed from it.

The error in the reading introduced by this small distance will be very small compared with the error due to the eccentricity caused by the above mentioned bending. But, supposing the case that in a badly constructed needle of this class one arm is bent more irregularly than the other, so as to unsymmetrically distribute the mass of the metal of the needle, then the resultant polarity consequent upon the irregular distribution of masses of the metal may be slightly at an angle to the line passing through the ends of the needle, causing an error due to the divergence still very small as compared with the error due to the eccentricity such a needle would have.

So far in the foregoing explanation we have dealt with the magnetic needle alone. It will now be necessary to treat this task in relation to other functional parts that go to make up a surveying instrument, since there are other causes, which, singly or combined, may conduce to produce the differences mentioned in the reading of different needles.

However, before dealing with this subject in its further complexity in relation to the compass and instrument, we first of all take it for granted that there be no local attraction in the instrument itself or by any iron concealed on the person of the observer.*

Next we assume that the graduation of the compass is a good one and that the pivot on which the needle rests is in the center of the graduation, and that both ends of the needle read precisely 180° apart.

Next, that the needle will be so sensitive that when deflected from its pointing by the outside attration of a piece of iron held about a foot or so away from it, it will settle to its original position several times in succession. This sensitiveness depends on the form and sharpness of the pivot, strength of its magnetism and its bearing upon the finely polished jewel or steel cap. (*It is generally owing to the dulling of the point and the scratching of the cap that a needle becomes sluggish and refuses to return to the same point.*)

Then the extreme ends of the needle should come close to the graduation and, together with the point of suspension, lie in the same plane with it, so as avoid parallax in reading. It is also important that the center of gravity of the needle be as far below this plane as possible in order that the quivering of the needle, so necessary to insure the proper settling of the needle on the pivot, shall not be annoying. If the extreme ends of the needle and the point of suspension are in the plane of the graduation, the quivering motion will not be annoying, since the extreme ends lie in the axis of quivering and consequently are stationary as shown in Figs. 3, 4 7 and 9. In Figs. 1 and 2 the plane in which the needle and its ends are contained is much below the axis of quivering which lies in the point of suspension and in consequence such needles can only be read when they have ceased quivering.

With a compass constructed as above we see no reason why its needle, or any number of needles of the same shape as shown in Fig. 7, should not give the same reading as long as the compass and its immediate surroundings remain undisturbed.

Our task of showing that in a theoretically perfect compass the needle will always assume magnetic North and South,—debarring erratic oscillations due to earth currents—would, therefore seem to be ended were it not for the fact that in a surveying instrument a sighting arrangement, telescopic or otherwise, must be provided, by means of which natural objects can be viewed and their relative positions in azimuth determined with regard to the stationary pointing of the needle in the magnetic meridian, affording a means for measuring angels and tracing lines. Seen from this standpoint, it is therefore all-important that the plane passing through the slits of a surveyor's compass, in which the line of sight is contained, be truly in line with the zero points of the graduated ring and at right angles to the plane of the same. With the transit, the line of sight, as defined by the optical axis of the object-glass and the cross wires of the telescope must not only revolve in a vertical plane in which the line of collimation is contained but this vertical plane must also either cut the zeros of the graduations or at least be parallel to the plane passing through them. This condition is, however, so difficult of attainment in instruments fitted with a telescope and in cases where it may exist it is so very apt to become deranged, that the writer is sure that right here the principal cause can be found for most of the differences observed in the reading of the needles of different instruments, though observed at the same time and place. To illustrate this: suppose we bisect a distant natural object with the cross wires of different instruments whose lines of collimation are in perfect adjustment, then the readings of the needles—assumed to have both of their principal axes in coincidence—

*To determine whether an instrument itself has any iron in it to disturb the needle, it is a good plan, after setting the transit so that both compass needle and the vernier read zero, to go around the circle, setting the vernier ahead ten degrees each time, and noting whether the compass needle also describes an arc of precisely ten degrees. If it does not, there is some local attraction. Before making this test it will be well to first test the needle as to sharpness of pivot—mentioned later on—and to breath on the glass cover of the compass and on the rubber frame of the reading glass so as to remove any electricity which may be present. Both of these articles being insulators are very easily electrified by the process of cleaning in a dry atmosphere thereby affecting temporarily the reading of the needle.

would be the same if the zero points of the compasses are contained in the vertical plane of the line of sight. But, if on the other hand the initial points of the compass are not contained in the vertical plane of the line of sight the reading must differ by an amount equal to the angle of this divergence in any one of the different instruments. This index error, while often of no account in ordinary instruments, will exist, nevertheless, and must always be looked for, even in the best class of instruments, since in the field use of an instrument and by rough handling it is very liable to change.

This is particularly the case where a telescope is involved, since in its construction we have to deal with the optical axis, which, of itself, is of a very complex nature and subject to changes affecting its line of collimation in relation to the compass, and because of the changes occurring by rough handling in the position of the standards carrying the wye bearings of the telescope's axis of revolution in the customary instruments. Therefore, in order to eliminate all the errors due to the change of the line of sight with regard to the zero points of the compass, the instrument should be tested before any important work is undertaken with the needle.

Before proceeding to determine the index error or constant of the compass of a transit, it will be well to verify the adjustment of the line of collimation as well as its motion in the vertical plane. Then, having previously established a meridian line by three points in line, point the telescope to the mark at the North, read the needle at both ends, and, in order to eliminate all errors of eccentricity of the graduation or needle and thereby arriveat correct results, the instrument should be reversed on its vertical axis and the telescope again pointed to the mark at the north end as before and another reading taken from both ends of the needle.

The average of the four results will be the combination of both the index and magnetic errors and that of the declination of the needle—the latter being the angle the magnetic needle makes with the astronomical meridian at the place of observation. Naturally, then, in a theoretically perfect instrument, the reading of a needle at a place where East and West declinations join, would be zero when the cross wires bisect the meridian mark. However, as in the field use no instrument will retain its fine qualities and adjustments, it will be best not to depend on them, but to determine the index error and constant of the needle combined simultaneously, from time to time, by an observation on a meridian as above described, in order to apply it as a correction in precise work. In instruments fitted with a variation plate permitting the declination for any particular locality to be set off, the combined errors of the instrument and needle can at once be added to or subtracted from the declination, as the case may be. But as these constants differ in every instrument it furnishes the explanation to the question propounded in the beginning of this paper: Why do different magnetic needles not always point in the same direction, though observed at the same time and place? *Unless these constants have been previously determined and applied in every case.*

There are other reasons, such as the daily variations of a needle, which, according to temperature, latitude and season of the year, may amount to from six to sixteen minutes alone, showing why reliance on the reading of a magnetic needle can be placed only within certain limits and that it should be depended on only for general direction as required in filling in details. For exact work meridian lines run by solar or stellar observations should be depended on exclusively, to which end the modern solar attachment gives the fullest satisfaction.

In conclusion, we would say that such tests on a meridian mark, as recommended above, should be repeated often, and that in order to facilitate the work such meridian marks should be located at some convenient place so as to be within easy reach of the surveyor at all times.

In the selection of such a place care should be taken that there is no iron in the vicinity and that there are no electric wires, particularly those used for lighting or the conveyance of power within a radius of three to six hundred yards, or else a needle is apt to be affected by these currents as would be the needle of a galvanometer. Such a place, if properly selected and provided with permanent meridian marks, could at the same time be made available for verifying the telescope and level adjustments of the transit so necessary to its proper use. For the benefit of surveyors, the City of Boston, many years ago, provided such meridian marks on stones deeply set into the ground on Boston Common. Unfortunately, electric wires now pass all around these grounds, and even traverse them, so that reliance can no longer be placed on observations there made.

BOOK REVIEWS

The New Pacific.

By Hubert Howe Bancroft: Published by the Bancroft Company, New York City; $2 50.

This handsome volume is of timely interest, and is also likely to be long regarded as a standard authority on its subject. Mr. Bancroft established his position years ago as an historical scholar of wide attainments and thoroughgoing methods, and his latest work will add to his fame.

After pointing out the underlying and historic causes of the war with Spain, and describing briefly the more important actions on land and sea, Mr. Bancroft considers in detail the numerous questions raised by the policy of imperialism. His arguments will appeal to different minds with unequal force, but he has certainly presented both sides of the question with force and fairness.

All the foregoing is more or less introductory to the real subject, and the more original and valuable part of the work begins with the spirited account of present-day conditions in the Far East, and the part that European nations have played in shaping those conditions. The South Sea Isles, Hawaii—"the Pearl of the Pacific," and the Phillipine Archipelago are treated fully as regards their climates, physical characteristics, history and peoples. Nowhere else in the English language, in the same space, probably, is there so much authorative matter concerning this increasingly important part of the world.

In describing our own Pacific Coast, Mr. Bancroft is, of course, very much at home, and his chapters on that part of the "New Pacific" contain a complete presentation of the subject statistically fresh and authentic. One chapter deals with adventure, and describes notable voyages into the Pacific; another enters the field of romance, and tells all about Crusoe Island; while a third appeals to everyone with its irresistible title, "Leaves from the Log Books of the Pirates."

The New Pacific is attractively printed and bound, with an excellent frontispiece map, and a beautiful cover design stamped in gold on sea green.

Minerals in Rock Sections

By Lea McIlvaine Luquer, C. E., Ph. D. Published by the D. Van Nostrand Co., New York City.

In this little book of 110 pages, Dr. Luquer, of the Department of Mineralogy, Columbia University, tries to make easy by means o practical methods the identification with the microsope of minerals in rock sections. We use the verb advisedly, but would not in the least imply that the attempt will not be as successful as the well-known difficulties of the subject permit. Indeed, we welcome the work as a valuable addition to our scanty stock of text books on optical and microscopic mineralogy, and we do not doubt that it will be found of great value, both in technical schools and for practical field workers. The book is designed primarily for students, and at least an elementary knowledge of crystallography and mineralogy is necessary to understand it.

After an introductory chapter, outlining the elements of optical mineralogy, and another describing the petrographical microscope, Dr. Luquer makes a systematic, thorough, and highly interesting investigation of the microscopic and optical character of minerals. He then shows how sections of rock should be prepared for analysis and identification in the petrographical laboratory. A chapter on chemical and mechanical tests suggests various ways of confirming or correcting optical determinations in cases of doubt; and a valuable "Scheme of Classifications into systems of Optical Determinations," in the form of a compact tabular statement, closes the work.

Christmas B. C. Mining Record.

The Christmas number of the *British Columbia Mining Record* is an entirely new departure in the issuance of special editions. The publication ordinarily is a handsome, reliable and instructive journal of 60 pages 9x11½. The Christmas number of the *Record* is, however, a decided change, coming out in the form of an elegant book 7x10 with double column matter profusely illustrated with pen drawings and half tones. Mining news is conspicuous by its absence, and the space is taken up principally with very interesting facts and fiction. The number contains the following articles, some of which make very interesting reading:

"The Alaskan Question," by Sir C. H. Tupper.

"The Prehistoric Races of British Columbia," by C. Hill-Tout, F. A. G. S.

"The Rubaiyat of Free Miner's Certificate No. 65534a by J. H. M'G.

"The Assassination of Deaf Sam's Plum-Pudding," by David Falconer.

"Mac the Immaculate," by Arthur Scaife.

"Fooled," by Clive Phillipps-Wolley.

"The Unconventionality of Miss Churchill-Fane," by H. Mortimer Lamb.

"Captured Single-Handed," by F. G. Farron.

"British Columbia Before Federation," by E. O. S. Scholefield.

"The Indians of British Columbia," by J. W. MacKay.

"The Last Indian Battle," by G. Sheldon-Williams.

"Victoria: Its Natural Advantages," by C. H. Gibbons.

"The Introduction of Capital in New Countries," D. B. Bogle.

The only one of the above-mentioned sub-

jects that is at all likely to rouse the ire of the people of the United States is the first, written by Sir C. H. Tupper, whose sarcastic sayings have been brought before us heretofore. As usual, he looks upon one side of the question only.

The mineral wealth of Oregon is to be represented in Portland by Albert Tozier, Secretary of the Oregon Press Association, who has just issued the first number of his *Mines and Metals*, a 16-page monthly 10½x14½ inches, printed on book paper, four columns.

With the mineral industry of the Northwest in the flourishing condition that it has been for some time past, the success of this enterprise is assured, if it is kept up to the standard of the first issue, which well merits all the praise possibie to give it.

The Ridgeway Dynamo and Engine Co. of Ridgeway, Pa., manufacturers of the Thompson-Ryan Dynamo and the McEwen Automatic Engine, have just issued their catalogue, which contains descriptions and illustrations of the above mentioned machinery.

There are 116 pages 8x10, printed in two colors, the illustrations in black and the descriptive matter in light brown. Many of the illustrations have been artistically vignetted. A view of the works of the firm forms the frontispiece of the book. The whole is covered with a handsomely embossed cover, showing a view of the dynamo and engine direct connected ready for operation.

The Champion Mine Ventilators manufactured by the M. C. Bullock Manf. Co. of 1169 W. Lake street, Chicago, Ill., has attracted so much attention that the firm considered it necessary to issue a Catalogue No. 35, devoted to a description of the machine.

The pamphlet is neat, well printed, contains 16 pages and cover, profusely illustrated with views of the ventilator as a whole or in parts, and is well arranged.

One fault, and the only one we can perceive, is the attempt of the printer to make black ink show up on the inside of a dark purple cover instead of inserting another sheet of white and printing on that.

CORRESPONDENCE

ARIZONA

(From Our Special Correspondent.)

CHLORIDE, ARIZ., Dec. 24.

EDITOR JOURNAL:—The closing days of the old year see this mining district in a threefold more prosperous condition than ever before. In fact, a great majority of the present prosperity had its inception within the year, and much of it in the past eight months. The former producing mines have largely increased their outputs, and new mills, hoisting works and other machinery of a new and improved character have taken the place of more primitive methods in work until now can be boasted the best mills, mines and machinery in the Territory. In this time, too, many prospects have become steady producers of milling and shipping ore, followed by many more in a state of new development. All things look bright for the district, and the ensuing year will doubtless see as many new improvements and mines as have preceded it in the twelve months before.

There has been a falling off in the production of ore in the Tennessee Mine to the extent of laying off the night shift at the concentrator. Up to this time there had been nearly 200 tons of ore put through the mill each twenty-four hours, taxing the works to their utmost capacity and working a large force of men. It is learned, however, that the ore body in the lower workings of the mine is yet of good size and steadily maintaining its character of richness and value. The facts cannot be had very accurately, but it seems that the falling off in production was all caused by the ore body pinching in a large South drift from the 250-foot level. It is also learned that the ore body had been showing signs of giving way for some weeks prior to the laying off of the night shift. Full forces of day and night shifts are still kept up in the mine, and it is said that some new development work now going on will bring to light a new and larger body of ore than ever before.

The new concentrator at the Merrimac Mine is fast approaching completion, and preparations for work, and it is thought that the first of January will see it treating the large ore dump awaiting its erection. The deep shaft and North and South drifts are all in good ore bodies, and their richness of a standard shipping quality. As soon as the mill is ready for use, the day and night forces will be largely increased in the mine, and some new development work begun.

The Elkhart Mine has its main working shaft down to the 500-foot line and all the way in a big body of ore and no signs of it giving out. The concentrator is kept at fever heat, it may be said, and is yet far behind in the treatment of the output. The mine is receiving good supplies of square timbers almost daily, both for old and new work. Dr. Comstock is here managing the mine and works in person.

Judge Costigan, who recently purchased the Queen Bee Mine, at Mineral Park, has all the old drifts and tunnels well cleaned out and men engaged on the old ore chutes. In the breast of one 300-foot drift that was filled up with debris, there is a good vein of ore in plain sight which is of high grade. Other work is showing up much the same. A new boarding and bunk house is already up and in use, and about fifteen men engaged in and about the mine.

A good sized body of 1,500 ounce silver ore was broken into on the Grand Army Mine at White Hills one morning this week. The discovery was made by James H. Carpenter and Edward Roberts, leasers on the company property. The ore vein is holding out well, and the fortunate owners have put two shifts of men at work to save the ore before their lease expires.

CALIFORNIA.

The Manvel Gold Fields Deals.

(From Our Special Correspondent.)

MANVEL, Dec. 16, '99.

The sale of a group of mines in the Manvel District has taken place, and the deeds have been placed in escrow in the Citizens' Bank, at Los Angeles. The group is composed of the Old Shoes, Red Bug, Patsy Bolivar, Harmony, Standard, Central, Polka Dot, Bull's Eye, Meteor, Full Moon, Half Moon, and Coined Money mining claims. The consideration is said to be over $5,000, and some reports say they are about to change hands again for more than double that sum.

The Old Shoes claim has over 60 inches of gold ore of a good grade, at 15 feet from the surface. Development work is in progress and improvements being put in. A ladder and windlass are to be put in over the shaft, and it is the intention of the present owners to sink the shaft to 100 feet in depth immediately, with three shifts of men.

The boom! boom!! boom!!! of blasting on the east slope of New York Peak lasts all day long now.

The Copper World belongs to the Ivanpah Mining and Smelting Co. It is located on Clark Mountain, west of the old Ivanpah Silver Mines (now idle). Last month, the company shipped five car loads of copper bullion. "Lot 29," amounting to 235 pigs copper, and have 100 more pigs piled up at smelter, each pig weighs about 300 pounds. There are about 80 men on the Company's pay roll. This mine is about 35 miles from Manvel (not Blake, as stated in your issue of December 1, '99). Thirty-three tons of ore come down each day from the mines, 5 miles, to the smelter at Valley Wells, by 20 animal teams, hauling two wagons. Four and one-half tons of coke are consumed each day by the smelter.

LATER:—Mr. Louis Spear has just sold to an Akron, Ohio, capitalist, the Old Shoes group of claims on New York Peak about two miles Southwest of Manvel. The price paid was more than $12,000 and first payment paid with deeds in escrow in Los Angeles. Same purchaser secured three others and an option on three more; 250 feet of development to be begun at once with 100 foot shaft on the Old Shoes claim.

Native copper in quantities has been found at the Mineral Queen claim, owned by Gus A. Hamsladt and others near the summit of New York Peak. They are fine samples, indeed. Crosscut on vein 57 feet and not through yet.

On the foothills of New York Mountain near the Coined Money claim Mr. Lecyre has several new lodes and fine ore. It is about three miles Southwest of Manvel. The ore is gold rock. A good strike was made in the Good Hope Mine on Dec. 11th.

A rich strike of 2100 oz. silver ore in the New York Mine is reported. They are shipping ore by car lots.

Bob Young has a sale pending on his group of gold mines. The ore body, 35 feet in width, samples throughout $40 in gold per ton. The price to be paid is several hundred thousand dollars. It is a large group of claims which are extensively developed and there is much ore on the dump.

The data for a 120-ton smelter near Manvel is being obtained for Eastern capitalists. Report is to be in by March, 1900.

Several cars of copper bullion, copper, lead and gold ores were shipped out last week and still it comes.

GILES OTIS PEARCE, M. E.

Miscellaneous Mining News.

ARIZONA.

At Dos Cabezas, Cochise County, a force of men are at work developing the Oregon Mine.

C. M. Roberts and other Missouri capitalists are said to have a bonanza in the White Billings mines. The ore is copper sulphurets of which there is said to be a seven foot vein.

George Metz is working twenty-five men on the Cottonwood Mine and has also begun the development of the Artic copper mine, bonded from the Fall estate. The Cottonwood Mill runs day and night on gold ore.

F. M. Frank of Los Angeles, Cal., recently forwarded a shipment of ore from the Climax Mine, on which he has made the sec-

ond payment of $2000 to Demorest & Rieder. Six thousand more is to be paid February 1st.

Philip Waughtal lately discovered a ledge near Dos Cabezas carrying 116 oz. silver and $10 in gold, which indicates that there are good mines yet to be found.

The Fortuna Mine near Yuma, it is said, is turning out $40,000 per month.

CALIFORNIA.

AMADOR COUNTY.

The *Amador Ledger* says a milling test of ore from the Central Eureka Mine of 357 tons will be completed at the Zeila Mill this week, the product from which will be about $100 per ton. The shaft is down about 1635 feet, 250 feet of which is in the ledge, as are also several drifts.

CALAVERAS COUNTY.

The property of the Esperanza Quartz Mining Company at Mokelumne Hill has been mortgaged for $100,000 under a trust deed made to Philip V. R. Ely of Boston, Mass, and Charles G. Burnham of New York City as trustees. The deed covers all the company's property, real estate, mines, mining properties, mineral claims, leases, incomes and everything of value possessed by it.

The old Tom Martin gravel mine, owned by George W. McNear of San Francisco, is to be opened up. The channel, so far as prospected, shows a bed of gravel averaging about eight feet in thickness and prospecting well throughout.

Report says that the great Harris Mine is turning out rock worth from $700 to $1000 per ton. The mine is down 336 feet, at which depth the ledge is fifty feet wide. The ore taken out is heavy with galena. The shaft is to be sunk to a depth of 1900 feet, and a 40-stamp mill is to be erected after the first of the year.

The copper mine at Copperopolis has been unwatered to the fifth level, which leaves 400 feet yet to be cleared of water. As the largest stopes are yet to be reached, the heaviest work is not yet finished.

Work has been commenced in the old Zeigler Consolidated Gold Mine. This is one of the old time mines, and a great deal of gold has been taken out of it. They now have a tunnel 212 feet run and will extend it. All of the former milling has averaged well, as high as $68 to the ton for sulphurets. It is located on main ledge of the mother lode.

INYO COUNTY.

The expected development of the immense copper deposits of Saline Valley and near Sodaville will afford markets for all the produce that Owens Valley will have to spare. The wealth of Ballarat and the early extension of the Randsburg road to that point will create a boom for that magnificently mineralized region, says the *Inyo Register*. The mining developments near Independence and the number of rich prospects found of late in different localities in the county contribute more or less to the hopeful outlook. Railroad possibilities, like the proverbial poor, are always with us, but indications are more favorable for improvement in this line, to the benefit of the valley, than for a long time.

KERN COUNTY.

The decision of Judge Ross in the celebrated Coalinga oil claim case comes at an opportune time, as it will tend to clear the atmosphere of many illusions. It seems to settle the law as it was long ago settled by the Land Department, and re-establishes the fact that the man who makes the discovery is the one who is entitled to the land. So those who have been making "locations" by the score without any tangible evidence of oil will now find themselves less wealthy by several millions than they were before. And those who are willing to risk some money on the venture will have a fair chance to develop the country.

PLACER COUNTY.

The Polar Star Mine at Dutch Flat put four monitors into operation lately. The mine employs a large force of men. Two thousand inches of water are used under a pressure of several hundred feet. The gravel is coarse, and large quantities of powder are needed to dislodge it from the bank.

The three-stamp mill at the Rawhide Mine is crushing ore steadily. This mine is owned by J. T. Patrick and is located on Texas Ridge, two and one half miles above Euchre Bar and five miles South of Blue Canyon, near the Golden West Quartz Mine owned by Reuben H. Lloyd. The main tunnel is in over 1,000 feet and a lower tunnel has been started. The ledge is from two to five feet in width and is bringing good returns.

PLUMAS COUNTY.

The work of opening the Rich Bar gravel mine near Quincy, is proceeding favorably. The company have a fine opportunity for a rich mine. They are opening up virgin gravel which could not be worked in early days of primitive methods. Rich Bar, in the early '50s, was a camp which yielded millions in gold, one of the most famous of the State.

SAN BERNARDINO COUNTY.

The Manila group of three claims, owned by Crothers & Hopper, situated near the Kestler Ranch, in the New York Mining District north of Manvel, is about to be sold. A rich streak of ore, fifteen inches wide, assays 364 ounces in silver. The whole ledge, outside of the rich streak, will assay 45 ounces in silver. The consideration to be received was not made public.

Samples of ore from the New York Mountain, north of Manvel, have been received in Los Angeles. The specimens are most beautiful, showing some native copper and silver. Other specimens among the lot were rich gold ores, heavy with iron pyrites.

A considerable number of complaints have been received regarding the excessive freight rates charged by the California and Eastern Railway Co. from Blake to Manvel, besides the trains run only Mondays, Wednesdays and Fridays, and the fare is $2.50 each way. Some of the miners from the section say they have requested R. S. Seibert, General Manager, to reduce the rate, but so far have failed to have anything done to help them.

SISKIYOU COUNTY.

The big square basin now being dug near the bed of Yreka Creek, just below the town of Hawkinsville, will soon be completed, and the work of building a dredger commenced. After the dredger is finished, water will be turned in from the creek to float the same, towards commencing operations in digging down to bedrock all the way up to the Yreka townsite boundary.

TUOLUMNE COUNTY.

Ore is being stoped out of the East and West drifts on the 300 level of the Hope Mine. The vein is 28 inches in width, carrying free gold and a small percentage of exceedingly high grade sulphurets.

The mill of the Arbona Mine, at Tuttletown, is now running.

The Silver Canyon Mine, on Deer Creek, four miles above Riverside, has been bonded to San Jose parties.

Some very rich ore was recently encountered in the Black Oak Mine.

The 5-stamp mill building on the Free Lance Mine, situated on the Berger Ranch, 12 miles from Sonora, is nearing completion and will start into operation shortly.

The work done on the Western extension of the Star Mine shows the same character of ore contained in the Star.

COLORADO.

The Colorado-Philadelphia Reduction Company is seriously considering the erection of a chlorination plant at Cripple Creek, equal to, and probably superior to, the one now located at Colorado City. The officers of the company are not ready to give out figures, but it is safe to say that the cost of the new plant will reach $500,000.

What will probably be the strongest combination of capital and land in the Cripple Creek District is now being formed. David H. Moffat has disposed of his Gold Knob property at camp, and the same passes into the hands of the people who are reorganizing the company. Besides a big cash consideration, Mr. Moffat has received stock in the new company for his property.

The Eighty-one Mine, in Gold Brick District, Gunnison County, owned by D. T. Sapp of Gunnison, has opened a good ore body at a comparatively shallow depth. The shaft is only 60 feet deep on the vein, and has exposed in the breast from four to eighteen inches of ore, that yields from four to five ounces of gold and ten of silver per ton.

The shaft of the Central City Mine, Gilpin County, is now down to 650 feet, a contract for 100 feet having been finished the past week. Levels have been started east and west, and sinking on the shaft on another lift of 100 feet will soon be resumed. This mine makes regular shipments.

The Gilpin Tramway Company has nearly completed laying the new track to the Fourth of July Mine on Quartz Hill, and that property will soon be making regular shipments to its mill on North Clear Creek. Chicago parties are interested.

The annual meeting of the stockholders of the Pharmacist Consolidated Mining Company was held in Cripple Creek recently. The officers elected were James F. Burns, president; Dr. Graham, vice-president; C. N. Miller, secretary and treasurer. These, with A. D. Jones and A. E. Carlton, compose the Board of Directors for the ensuing year. The compromise of the suit of the company against the Zenobia Company was ratified at the meeting. All the properties of the company are being worked and considerable ore is being shipped by lessees.

IDAHO.

A ledge of phenomenal richness is reported as having been discovered in Custer, in the vicinity of the Bull Dog Mine. It is eleven feet in width, containing a streak from six to fourteen inches wide, samples from which make the following showing: One sample,

described as black quartz, carried 1035 ounces per ton in gold and 5780 ounces in silver, the total value being $28,843.45 per ton. A sample of oxidized quartz returned 450 ounces of gold and 2800 ounces of silver, its total value being $10,981.50 per ton. Another sample of the same character gave returns of 627 ounces gold and 3400 ounces silver, the value being $15,000.09 per ton.

The storm and cold weather have resulted in a pretty general suspension of placer mining in the gold belt near Wallace. The big syndicate shut down a week ago, and smaller affairs are following suit. For those who are drifting however, particularly on Trail Gulch, the next three or four months will be the busiest time of the year, as there is less water to interfere with them.

The Nine Mile Mining Co., whose property is located at Nine Mile, near Wallace, have reported a strike of rich ore in their 260 foot tunnel on the Speckled Trout Mine. Ore has been found in the tunnel ever since work commenced on it, but was broken up until this strike just reported, when the ledge was found to be solid.

Papers were signed this week by which Finch & Campbell secured the privilege of purchasing the Granite Mine on East Nine Mile. The amount of the consideration placed on it by the owners is not learned.

MICHIGAN.

Rock rich in copper has been encountered in both the shafts and drifts in the Victoria mine at Hancock.

In No. 3 shaft, which is down to a depth of 370 feet, drifting is going on east and west at the 6th level with splendid indications In the south crosscut in No. 2 shaft the miners have already gone through two veins at the 4th level, one of which is 10 ft. wide and is heavily charged with barrel work and shot copper. It is expected that about 200 feet further on in the crosscut in No. 2 shaft at the 4th level, the vein known as the Forest conglomerate will be struck which from the surface indications it is thought will contain much copper. Work has begun on another shaft which will be three compartment 1,100 ft. west of No. 2.

The Tamarack mills at South Lake Linden have commenced shipping copper to the smelters in cars instead of barrels. The little cars have a capacity of three barrels and are loaded on the railroad cars, which makes a very convenient way of handling it.

At South Lake Linden Armstrong & Thielman's mill closed down Dec. 15 for the season after a very successful run this year. It is understood most of the men in the mill will work in the woods this winter.

At the Michigan property in Ontonagon County, hoisting is going on from three shafts and between 150 and 175 men are employed. The new "C" shaft is down 105 feet and will meet upraise by the end of this month, which will bring it to adit level at Rockland portion of property. At a depth of 142 feet a level will be opened and a connection made with first level in "B" shaft.

MINNESOTA.

Shipments of ore have ceased from the Duluth Docks, of the Duluth, Mesabe & Northern road, with a total for the year of 3,300,000 gross tons, which is against a total of 2,635,000 tons last year. The Eastern Minnesota is still shipping and will have a a total of about 890,000 gross tons as follows: Mahoning, 750,000 tons; Sauntry, 50,000 Penobscott, 90,000. The road shipped 550,000 tons last year. The Duluth & Iron Range has passed a total of 3,900,000 tons, and is shipping almost as actively as ever. It is intended by the company to carry on business till January 1st, and, if so, its total will be 4,300,000 tons. The continuation of work at these docks and the running of ships to January will have a very marked effect, if successful, on the question of winter navigation in future.

The Duluth, Mesabe & Northern has ordered 500 30-ton ore cars from the Pullman Company and eight locomotives from the Pittsburg Locomotive Works. Seven of these will be the regular road engines and one a very heavy locomotive for hill work. This makes a total additional car equipment for the three Minnesota ore roads equivalent to 2,000 25-ton cars.

MISSOURI.

Burt Minor & Co. of Joplin, have a lease on Section 7, South of Childress Ford, below Saginaw, which they are prospecting. In the first shaft lead was struck at a shallow depth, when it was abandoned, but in the second shaft open ground was encountered and sinking is progressing rapidly. Concerning this tract on the Northwest, good jack has been struck at 70 feet, which is running toward their land, and they believe they will also encounter ore at about the same depth. This new tract lies between Saginaw and Spurgeon, with Spring City on the West and Tipton's Ford on the East. The operators are all Joplin parties, the land also being owned in that city.

The Victor Company, owing to a pitch in their ore, are compelled to sink their shaft deeper; this they are doing.

Supt. White is taking out some fine pay dirt from the Katy Mine this week. They have gone through five feet of dirt, which contains both lead and jack in paying quantities. Nothing would please this community better than a veritable bonanza on that land.

The Ishpeming shaft, on the Knight land, is still going down on the richest kind of ore. It is now down 137 feet, and when Supt. Storey was asked how much deeper he was going, he answered that if he could be told how deep the ore-bearing ground was he could answer the question. They will not stop as long as their is ore in sight.

MONTANA.

Major Berry, administrator of the estate of John H. Berry at Whitehall, shipped a two-ton lot of ore from the Blue Bird last week.

Showers, Tebay and Camplan closed a bond and lease on the Fairview Mine near the Mayflower District to Thomas Evans recently. The mine is to be worked continuously.

As soon as teams can be procured, McCall, Davis & McCall will ship two carloads of ore from the Ruby C. in the Coal Cañon District, near Whitehall.

In doing the year's representation work on the Grasshopper Lode at White Sulphur Springs, B. B. Sherman has taken out several tons of lead ore which he has decided to ship to the smelter as a test.

The Mussigbrod Mill at Deer Lodge is now running on Shamrock second-class ore, of which there are about 400 tons on the dump. The winze in the Shamrock still continues to produce very high-grade ore and the property never looked better.

The report of Receiver Bacorn of the American Development Company at Gibbonsville, Lemhi County, in whose list of properties the Golden Sunlight group is included, shows that the properties have been earning a trifle more than the expenses. The profit side of the report showed about $2,000, with more probable.

NEVADA.

A strike of high-grade ore has been found in the Yuba Mine, near Pioche, Lincoln Co.

The crushing of ore at the Chainman Mill at White Pine has been resumed. Steam pipes have been placed under the tanks and everything about the mill is in apple-pie order. No more shut-downs need be expected.

Henry Anderson, G. A. McDonald, T. H. Deegan, John Kellock and Gotchie Allen have located claims on Granite Mountain in Peavine District, on a ledge into which they have run a tunnel 225 feet. At the point of contact the ledge is eleven feet wide and has a pay streak one and one half feet in width, which assays, according to two samples, $102.04 and $208.30 per ton, 50 per cent being copper. The rock goes over $40 in gold, which can be plainly seen with the naked eye in some of the samples. The ledge dips to the South at an angles of 45 degrees and can be traced for 3000 feet. It is the intention of the owners to run a tunnel into the mountain so as to tap the ledge 150 feet below the surface and then stope out the ore.

NEW MEXICO.

The Montezuma Gold Mining and Placer Company has bought the Red Bandana group of mines near Elizabethtown. The price paid is $250,000. Charles J. Dodd is Superintendent and Manager for the company.

The Bayard Smelting and Milling Company are operating the old Texas Mine at Central and running a 50-ton concentrating plant with rollers, jigs and vanners.

The American Turquoise Company, whose mines are located at Cerrillos, are preparing to send the finest collection of the beautiful gems to the Paris Exposition ever collected.

Henry Wood has taken a six months' bond on the Monument Mine at Bland.

Thomas Scales is getting out a carload of ore from his Dictator Mine in the Cuchillo Mountains near Chloride. The shaft is 40 feet deep. The full width of the shaft is in ore and runs 7 per cent copper, 28 per cent lead, with a small amount of gold and silver.

The Argonaut, owned by Mr. Frank Reavis; the Polomas Chief, owned by Mr. J. C. Plemnons; the "L," owned by Mr. E. J. Doran, and the Humming Bird, by Mr. Marshall, all of Hermosa, are shipping to the smelters at Pueblo and El Paso.

OREGON.

The Don Juan Mine, located near Bonanza, Ore., at one time the property of Mr. Jacobs, formerly a well-known Southern Pacific passenger conductor, who operated passenger trains between Ogden and Carlin, Nev., has been sold to O. G. Larrobee of Spokane, Wash. The Don Juan has about 500 feet of developed work done upon it, and is equipped

with a modern ten-stamp mill. The property is said to have produced about $80,000. When Mr. Jacobs had the mine he extracted and milled some very high-grade ore.

SOUTH DAKOTA.

The owners of the Durango Mine, at Lead, are trying to concentrate some of their wolfram ore in the Cris Ruth Stamp Mill, in Sawpit Gulch. It is stated that this ore contains about 40 per cent tungsten acid, which is little less than that found in Southern Hills.

It is stated that a deal is pending between the owners of the Dalton group of claims, in Sheeptail Gulch, and eastern parties. A 40-foot shoot of ore has been encountered in one of the tunnels of this mine, and a 4-foot vertical has been crosscut which carries very high values in gold.

The Boston-South Dakota Mining Company is now running the full 40 stamps at the old Minerva Mill, next to the Deadbroke. The company has done a great amount of retimbering in the old workings of the mine, and practically all of the stamps are new.

The Baltimore & Deadwood Mining Company is running the 20-stamp mill at Gayville on full time. About 100 tons of ore are treated daily. One shift of men in the mine is able to break down enough ore to run the mill 24 hours. They employ about 15 men.

WASHINGTON.

The Columbia Gold and Copper Co. owns three claims, a tunnel and a mill site adjoining, all located about fifteen miles northeast of Republic, in what is known as Belcher Camp. There are two strong, distinct parallel ledges at a distance of 400 feet, one of the strongest surface showings in the Colville country. This mammoth ledge is fully 3000 feet in length. Assays run as high as $120 in gold, copper and silver. Have shipping ore on the dump; character of the ore is the same as the Belcher and Le Roi. Active development work is going on with very satisfactory results; no more than three assessments in one year, and no assessment more than one mill per share; directors are well known business men of undoubted standing.

The Blacktail property at Republic is looking well and development shows values equal to any found the past few months; eight men are employed. They have some $4000 in cash for development work and a large amount of treasury stock on hand. Most of the ore is rich enough to pay for treatment and leave a good margin of profit.

Superintendent Wyatt reports he has a body of ore 400 feet long, 300 feet wide and 16 feet high in the Mountain Lion ready to be stoped when the mill starts. This is approximately 1,920,000 cubic feet of ore. The work of blocking out is being pushed by forty men. Drifting continues on the 300 and 425 foot levels. All machinery received to date has been installed; impassable roads prevent arrival but now that snow is there it will soon be delivered.

FOREIGN MINING NEWS

MEXICO.

Work upon the new cyanide plant of the Minas Prietas Reduction Syndicate (limited), at La Colorada, is progressing rapidly as men nd money can push things, and it is now so far advanced that the ordinary observer can see that it will be a stupendous plant. The process to be used is known as the Siemens-Halske process.

Last month, La Bufa, (The Buffalo) the silver mine beyond La Barranca, paid a dividend of $1,500 per share.

The Churchill, a gold mine near Atlas, in the State of Sonora, has been bought by Californians for $30,000.

The New York and Sonora Mining Co., at Las Cruces, Sonora, J. B. Magruder, manager, is crowding work on its new smelter. It will be in readiness to blow in about March.

The Tajos Mine, State of Durango, near Culiacan, has been incorporated under the laws of the State of Delaware with F. H. Prentiss President and G. Gurney, Vice-President and Manager. The sum of $30,000 will be spent for machinery. The property consists of fifteen claims.

Manager James I. Long is busily engaged in making preparations for operating several new mining properties at Parral belonging to the Hidalgo Company. Their works will be largely increased for the coming year.

Latest Mining Decisions.

Prepared for THE MINING AND METALLURGICAL JOURNAL, by Andrews & Murdoch, Berrien Springs, Michigan. Credit must be given when reprinted.

Under Code Civ. Proc. § 1183, which provides that any person who performs labor in any mining claim has a lien on same, and the works used in connection therewith, for his work and labor, a person who has performed work for one in possession of a mining claim under a contract for the purchase thereof, which contract provided that, if the purchasers failed to complete the contract, they could remove any machinery affixed by them, has no claim on machinery leased by the latter from a third person, with a privilege of purchasing, and permanently attached to the claim, though the lessor gave no notice of his ownership, and the lessees of the machinery never completed the contract for the purchase of the claim. Jordan vs. Meyers et al., 58 Pac. Rep. (Cal.) 1061.

PERSONAL NEWS ITEMS

J. P. MILLS, Mining Engineer of Butte, Mont., is now at Pinos Altos, N. M.

FRANK B. TURNER was in Butte, Mont., last week from the Madisonial Mine.

LOUIS J. SPEAR, of Manvel, Cal., called at our Los Angeles office last week.

ISAAC REED, of Dale City, Cal., called on the JOURNAL'S Los Angeles office recently.

GEORGE H. ELLIS, of Chicago, has been examining a mine in Colorado for Chicago people.

B. E. FINE, a prominent mining man of Madison County, Mont., was a Butte visitor last week.

GILES OTIS PEARCE, M. E., was in Los Angeles, Cal., from Manvel, and visited this office last week.

A. H. WADDELL, formerly of the Union Iron Works, San Francisco, has charge of a gold dredger at Adams Flat, N. Z.

F. H. HARVEY, E. M., of Galt, Cal., has recently completed an examination of the Lamphear Mine, near Mokelumne Hill, Cal.

W. W. MORRIS, the well-known mining man of Pony, Mont., and for a long time a resident of Virginia City, Mont., was in Butte recently.

C. E. WATSON of Carson, Nev., has been appointed Superintendent of the Almono Mining Company in Antelope Valley, Mono County, Cal.

L. C. DU BOIS, of Turret, Colo., has accepted the situation of superintendent of the Crown Point and Virginia Mine, near Central City, Colo.

R. N. DICKMAN, of Dickman & Mackenzie, Chicago, Ill., is now in Cuba, where he has gone in the interest of New York men, to examine iron mines.

H. J. SUARTO and G. E. RUSSELL left Los Angeles, Cal., on December 19th, for Box Canyon, Snake River, Oregon, to work some placer bars in the Snake River.

G. J. ROCKWELL, who has taken over El Puertecito Mine, in the Cananeas, Sonora, Mex., is shipping into camp, via Naco, thirteen carloads of machinery.

WM. H. EDGAR, President of the Dearborn Drug and Chemical Company, has returned to Chicago, after a business trip to the West, including the Sandwich Islands.

COL. JOHN DOYLE, a well-known Montana mining man and prospector, has recently returned from an extended trip to the principal mining centers of that Territory to Butte, Montana.

JOHN DOBSCHER, of New York, President of the Siskiyou Mining Company of California, has been making a personal inspection of the company's holdings in Siskiyou County, Cal.

JOHN H. LODER, of the Loder Pyritic Reduction Co., Denver, Colo., goes to Atlanta, Ga., to supervise starting a Loder pyritic smelting plant about completed in that vicinity.

D. C. LANE of Angels, Cal., is in San Francisco, Cal., from his mines near Parral, State of Chihuahua, Mexico. He will give particular attention hereafter to the silver-lead mines of that region.

CLARENCE HERSEY recently made examination of a mining property in Northern California. Mr. Hersey has continuously maintained an assay office in Leadville, Colo., for the last twenty-one years.

PROF. W. P. BLAKE, Territorial Geologist of Arizona, reports officially that thus far none of the samples of rock from the Arizona discovery submitted to him for determination as to platinum contents contain that metal.

BERNARD MACDONALD has accepted the general superintendency of the British American Corporation, Rossland, B. C. For some years he has been in Canada in charge of the McQuaig-Rykert Syndicate of Montreal.

JAMES MCGREGOR, for many years connected with the Crescent Mine at Park City, expects to go to Bayhorse, Idaho, where he will look after the property of the Salmon River Mining Company, in which he is the principal stockholder.

GOV. MURPHY of Arizona has appointed as delegates to the Mining Congress in Milwaukee in June, 1900, JAMES DOUGLAS, Priesdent of the Copper Queen Company; S. A. PARNELL, of the Globe Company, and J. B. SEAGER, of the Helvetia Company.

PROF. W. L. WATTS has returned to San Francisco from an investigation of oil lands in Monterey County, Cal. He has assumed his duties in the service of the State in a continuation of his labors in the petroleum fields and in the examination of mines.

F. M. GRAMMAR, who was formerly with the Duquesne furnaces of the Carnegie Steel Company, and with the Lackawana Iron and Steel Company, at Lebanon, Pa., has resigned to take charge of the blast furnaces of the Colorado Fuel and Iron Company at Pueblo, Colo.

A. S. GABBS, of the firm of Huntington & Gabbs, of San Francisco, Cal., has taken over the Animas Mine, near Querobabi, Sonora, Mex., and will erect machinery for reduction of the ores as soon as tests of the ore are made, to determine the kind of machinery.

THE HERCULES GAS ENGINE WORK, of San Francisco, Cal., have removed to their new offices and salerooms, Nos. 141 and 143 First Street. They carry a full line of Stationary, Marine and Hoisting Engines in stock, and some sizes of each will be set running, so that intending purchasers may see them in operation.

WILLIAM WESTON, of Cripple Creek, Colo., has just examined the Haseltine group of mines in Gilpin County, the control of which is owned in Scotland. He has undertaken to reorganize the company. He is going to White Hills, Arizona, where he is manager of the White Hills Mining and Milling Company, and has been appointed consulting engineer to the Lillie Gold Mining Company of London.

The Mining and Metallurgical Journal

THE MARKETS.

All quotations, financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue, and constitute a very accurate compilation of statistical matter.

METALS.

The following are the Silver, Copper and Lead quotations for the last two weeks:

		SILVER.	COPPER.	LEAD
Dec.	15	58¾	17 00	4 75
"	16	58¼	17 00	4 7[illegible]
"	18	59	17 00	4 70
"	19	59	17 00	4 70
"	20	[illegible]	17 00	4 70
"	21	59	17 00	4 70
"	22	59	16 50	4 70
"	23	59	16 50	4 70
"	[illegible]	[illegible]	16 50	4 7[illegible]
"	26	58½	16 50	4 75
"	27	58¾	16 50	4 75
"	28	58¾	16 50	4 70
"	29	58¾	16 50	4 70
"	30	58¾	16 50	4 70

SILVER

The Silver market has been steady and dull showing only small fractional changes during the week and closing at 26¾ d. in London.

COPPER.

Prices remain unchanged from those quoted last week. Lake copper 18½c, Electrolytic in cakes, wirebars and ingots 17 @ 17⅛, Cathode 16¾ @ 16⅞c, casting copper 17c nominal. The foreign market is still dominated by difficulties betw. England and Transvaal. London is quoted, English tough £78, 17s 6d £79 5s, best selected £80 5s @£80 10s. India sheets £83@£83 10s.

LEAD

Lead continues in good demand and with no change in prices. New York being quoted at 4.55@4 60c

The foreign market has been irregular but the tendency is upwards. Spot is quoted at £15 17s 6d@£16 2s 6d for Spanish and £16 5s@£16 7s 6d for English, while futures are at a discount of 5s to 10s

SPELTER

The disquiting news from the ore-fields stirred up consumers and a good business has resulted at stiffening prices. New York is quoted at 5.45@5.50.

The foreign market is also firmer and again higher good ordinaries being quoted at £22 12 6d, Specials £22 17s 6d

ANTIMONY.

Antimony is in good demand. We quote Cooksons at 10½@11c, Hallett's at 9¾@9⅞, U. S. Star and Hungarian 7½@9c.

NICKEL.

Nickel continues unchanged and no alternation of prices can be reported. We quote for ton lots 33@36c per lb., and for smaller orders 35½@38c. London prices are 14@16d. per lb., according to size of order.

TIN

It is quite natural that this article, which is always volatile should suffer in consequence of the unsettled state of affairs abroad and the higher money market. Fluctuations have been rather wide but the close is again firm at £145 15s for spot and £146 2s 6d for three months

In New York the buying was restricted to quantities needed to cover immediate requirements although consumption continues at a fair rate. We quote Straits in carload lots at 32¼c f. o. b. New York.

PLATINUM

The demand for Platinum is good and prices are firmer. New York is quoted $17.75 per ounce for large lots and $18 for smaller orders.

POTASSIUM CYANIDE

Purified, 98@99 per cent., in cases of 120 lb. at 30c. per lb, in 5, 10, 25 and 50 lb tins at an advance

QUICKSILVER

The wholesale price in New York has advanced $1 and is now $48.00 per flask The London price has risen to £8 17s 6d per flask, with the same rate from second hands

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:	
No. 1, 99 per cent. ingots, per lb.	35@37c
No. 2, 90 " " " "	31@34c
Rolled sheets, per lb	38c. up
Aluminum.—Nickel, per lb.	33@39c
Alum-bronze	20@23c
Bismuth, per lb.	$1.45@1.50
Phosphorus, per lb	45@50c
Magnesium	$2.75@3.00
Tungsten, per lb.	70c
Ferro-tungsten, 60 per cent.	60c

Variations in price depend chiefly on the size of the order

ACIDS.

Acetic is in good request, muriatic is moving briskly on contract, and sulphuric is unchanged. Blue vitriol is quiet. Only 50 bbls. oxalic axid were imported this week.

The exports from the United States in August amounted to $12,653

BRIMSTONE

There are no arrivals. Spot best unmixed second $22@$22.50 per ton and shipments $21.15; thirds, $19. The imports of brimstone into the United States in August were 11,100 tons

NITRATE OF SODA

Demand is very quiet and quotations for all positions are nominally $1 65 per 100 lbs. Odd lots can doubtless be had at $1 62½. The United States imported 18,708 tons nitrate of soda in August

CHEMICALS

Most of the business done in heavy chemicals is for future delivery, the little doing on spot being at [illegible] prices Imports this week included 200 drums 210 casks and 2 bbls. bleaching powder Importers expect a curtailment of shipments from England When the Boer war is on, as the merchant vessels will be used for transporting troops to South Africa. Receipts of domestic goods at New York last week included 1055 sacks alkali and 250 drums caustic soda

Caustic soda high test is quoted per 100 lbs. f.o.b. works at 1.77½@1.82½ in New York, $1 85@$1 90. Bi-carbonate of soda is quoted per 100 lbs. f.o.b works, $1 12½ @ $1 25. Chlorate of potash crystals in New York are quoted for domestic, $8.75@9.00, foreign, $9 25 @937½; powdered domestic at $9 25@ 9.50, and foreign, 9 50@9 7[illegible]

CHLORIDE OF LIME

English prime brands are quoted at 1.65@1.75 with 1.50@1 60 for other brands

FINANCIAL NOTES.

AVERAGE PRICES OF METALS.

In New York per 100 lbs. from January 1st, 1899:

Month	Copper	Tin	Lead	Spelter
January	14.75	29.48	4.18	5.34
February	18.50	24.30	4.49	6.28
March	17.44	24.83	4.37	6.31
April	18.—	24.38	4.31	6.67
May	18.25	25.70	4.44	6.88
June	17.03	25.88	4.42½	5.98
July	18.13	29.63	4.52	5.82
August	18.50	31.53	4.57	5.65
September	18.44	32.71	4.58	5.50
October				
November				
December				
Average				

AVERAGE MONTHLY PRICES OF SILVER.

In New York per ounce Troy, from January 1st, 1899, and for the years 1898 and 1897:

Month.	1899 Cents.	1898 Cents.	1897 Cents.
January	59.86	66 77	64.79
February	59.42	66.07	64.67
March	59 64	64.90	63.06
April	60 10	56 02	61 85
May	61 23	56 98	60 42
June	60.43	58 61	60 10
July	60 26	59 06	59 61
August	60 00	59.54	54 19
September	58 89	60 68	55 24
October	—	60 12	57 57
November	—	60 60	57 91
December	—	59.42	58 01
Year	—	58.26	59.79

MONEY IN CIRCULATION.

Comparative statement of the circulation in the United States on Oct. 1st 1899. Comparison being made with statement on September 1st, 1899.

	October 1.	Changes
Gold	$646,561,185	D. $26,373,607
Silver	143,861,.05	I. 5,356,933
Legal Tenders	314,954,600	I. 4,324,179
Treas'y & N't'l B'k N'tes	329,688,956	D. 483,165
Totals	$1,434,014,746	D. $16,634,661

Gold and Silver certificates and currency are not included in this table. By adding the amounts given in this table with those in the following will give the total amount coined or issued. The figures herewith are furnished by the Bureau of Statistics Treasury Department.

MONEY IN TREASURY.

Comparative statement of changes of money in United States Treasury on Oct. 1st 1899, comparison being made with statement, on Sept. 1st, 1899.

	October 1.	Changes.
Gold	$122,271,989	I. $31,285,225
Silver	415,844,704	D. 4,650,483
Legal Tenders	31,726,416	I. 4,824 179
Treas'y & N't'l B'k Notes	4,850,547	I. 352.491
Totals	$673,693,656	I. 32,163,057

The Gold and Silver bullion on hand in the Treasury is not included in this statement.

GOLD AND SIVLER EXPORTS AND IMPORTS.

At all United States ports, for the month of Septemb., 1899, and 9 months ending September, 1898, and 1899:

SEPTEMBER

	1898	1899
Gold—		
Exports	$ 3,102,810	$ 618,995
Imports	16,808,341	2,593,894
Excess	I $13,705,531	I. $ 1,974,899
Silver		
Exports	$5,152,103	$3,622,041
Imports	2,000,696	2,376,846
Excess	E. $3,151,407	E. $1,245,195

NINE MONTHS ENDING AUGUST.

	1898	1899
Gold—		
Exports	$12,781,923	$32,877,838
Imports	127,343,816	34,268,421
Excess	I. $114,561,893	I. $ 1,390 583
Silver—		
Exports	$39,433,500	$38,738,431
Imports	21 099,224	22,724,095
Excess	E. $18,334,276	E. $16,014,336

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

WANTS

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers.

Other than above $1 00 per month

Advertisements not accepted for less than one month

COPPER MINE. State full particulars in regard to development work location, distance from water, price of fuel, character of ore and returns from shipments. Must have at least 1500 feet of development work. Send all information possible. Address,

JAMES HOWARD,
Care The Mining and Metallurgical Journal.
32 Broadway, New York, N. Y.

GOLD mine anywhere in *United States*, must have at least 1000 feet of *development*; where coal is *not over* $6.00 per ton or wood $4.00 per cord *delivered;* plenty of *water;* no objection to *low grade* ore if profit can be made by having *large plant* to *amalgamate* and *concentrate;* want 6 months working *bond;* no *property* considered unless *owners* are prepared to deposit *certified check* for expenses of *engineer* if *property* is not as *represented* Address with *price* and *full particulars*

J. B. M., Mining and Metallurgical Journal,
32 Broadway, New York, N. Y.

EXPERIENCED man desires position, who can install, run and keep in repair, Steam, Electrical and Mining machinery, has knowledge of assaying and office work. References Address: W. H. K., McCLOUD, CAL.

A PRACTICAL young assayer desires position as assistant assayer or helper around mill. Best of reference if desired. Address,

ALBERT GUY,
Y. M. C A., 209 S Bdway, Los Angeles, Cal

Gold, Silver, Copper, Zinc and Lead Mines.

Partner wanted who would invest $20,000 in developing a large Mining property located in the Territory of Tepic, Mexico, on the Pacific Coast. Gold mines ore averages from 3 to 30 oz. per ton of 2000 lb., Silver from 1 to 38 kilo, Lead from 15 to 30 per cent., Zinc from 20 to 25 per cent., Copper from 5 to 25 per cent. Reports, Maps and Samples sent on application. Waterfalls 500 H. P. and sufficient timber close to the mines Call or address,

ELIAS GALINDO,
94 Iturbide St., Tepic, Mexico.

NOTICE TO STEAM USERS.

The National Association of Stationary Engineers is prepared to furnish Engineers of guaranteed ability for any plant in the city or elsewhere. Give us a call

Address: J. T. CHAMBERS, Sec'y,
Engine Room City Hall.
Tel. Main 667. Los Angeles, Cal.

METALURGIST and experienced Assayer and Chemist, with practical experience in Copper and Lead smelting, desires position. Speaks Spanish, highest references, address "Globe," JOURNAL office

WANTED POSITION by experienced Amalgamator and general Mill man. Have worked in the largest mill on Pacific Coast and Mexico, speaks Spanish, highest references. Apply Con. C. W. Geoghegan Assay Office, 956 3rd St., San Diego Cal.

FOR SALE

WILL GIVE one-half interest in a group of five gold claims on the desert for parties who will put up mill and Cyanide plant

Address, "J. G. H."
Journal Office, Los Angeles, Cal.

A LARGE Gold deposit, will average $15.00 free gold suitable for Cyanide Process Twelve miles from Railroad, in Arizona Terms reasonable

H P. DURRELL,
El Paso, Texas

REMAIN Two Stamp Steam Mill at Tucson, Arizona. 15-H. P. Boiler Pump and every thing complete, set up ready for work. In excellent condition, used less than six months

Address DREDGING MINING MACHINERY Co
Kansas City, Mo

ANTIMONY **BISMUTH**

PROSPECTORS having locations of this nature and wishing to sell at once for cash, will do well to address with full particulars,

P. O. BOX 2078, SAN FRANCISCO, CAL

CHEMIST, 5 years training and knowledge of Mineralogy, desires position with prospecting party or as assistant in laboratory. Highest endorsements. Address,

J W BELL,
Ashville, N. C.

FOR SALE AT A BARGAIN.

A 60-TON copper Smelting Plant, consisting of two 30 ton furnaces, one of which has new seamless liner. Plant is complete in every detail. Also an 80-ton Silver-Lead Furnace, entirely new, never having been set up. All of the above located immediately adjacent to railroad. Enquire of GARDINER, WORTHEN & GOSS, dealers in Mining and Mill Supplies, Tucson, A. T.

MINING STOCK QUOTATIONS

BOSTON

[illegible]	6 12	Mass	10 00
Aetna	4 63	[illegible]	
Allouez	—	Mohawk	21 00
Anaconda	40 50	Napa	—
[illegible]	50 00	[illegible]	1 00
Arnold	10 75	Old Dominion	32 03
Atlantic	20 75	Osceola	86 50
[illegible]	24 00	[illegible]	45 50
[illegible]	15 25	[illegible]	1 00
Bonanza	1 63	Quincy	160 00
Boston & Mont'a	355 00	Rhode Island	8 75
[illegible]	2 50	[illegible]	12 50
Butte & Boston	79 00	Santa Ysabel	12 50
Calumet & Hecla	780 00	Tamarack	225 00
Catalpa	10	Tecumseh	5 25
Centennial	33 50	Tri Mountain	8 25
Cochiti	17 00	Victor	—
Copper Range	37 00	Victoria	5 00
Crescent	—	United States	30 00
Dominion Pref	—	Utah Con.	33 00
[illegible]	7 75	[illegible] M'ng	7 13
Gold Dredging	—	White Knob.	—
Humboldt	1 75	Winona	8 00
[illegible]	11 00	[illegible]	11 50
[illegible]	2 50	Wyandotte	3 85

ROSSLAND AND BRITISH COLUMBIA

[illegible]	28	Kootenay Gold [illegible]	
Brit.-Amer. Cor	—	Lerwick	—
[illegible]		[illegible] May	10
Canad. G'ld Fields	07¼	Lon & Van M D Co	—
Cariboo	1 10¼	London B. C. G. F.	7 00
Commander	—	Monte Cristo	05½
Deer Park	04¼	New G'd F'lds B.C.	3 50
[illegible]	19	[illegible]	
[illegible] Star	09	[illegible]	5 50
Fern	20	Rambler-Cariboo	80
Gold Fields of B.C.	—	Red Mount. View	—
Hattie Brown	—	Reco	—
Hall Mines	—	Silver Bell	—
Homestake	—	Silver Queen	
Iron Horse	08	St. Elmo	05¼
Iron Mask	75	Slocan Star	1 10
Josie	—	Vic. Tr M Dev. Co.	—
Jumbo	85	Waverly Mines	—
Kenneth	—	War Eagle Con	2 75
[illegible]		White Bear	

SAN FRANCISCO.

Alta	04	Mexican	30
Andes	10	Occidental	20
Belcher	33	Ophir	87
Best & Belcher	30	Overman	10
Bullion	04	Ontario	
Caledonia	70	Plymouth	—
Challenge	30	Potosi	58
Chollar	31	Quicksilver	—
Confidence	80	Quicksilver pre'd	—
Con. Cal. & Va.	1 85	Savage	25
Crown Point	15	Seg. Belcher	03
Deadwood	—	Sierra Nevada	02
Gould & Curry	25	Silver Hill	—
Hale & Norcross	37	Standard	1 85
Homestake	—	Union Con	30
Iron Silver	—	Utah	10
Justice	08	Yellow Jacket	10

COLORADO SPRINGS STOCKS

Acacia	26	[illegible]	02
Alamo	09½	Ingham Con	10
Altament		Isabella	81½
[illegible]		[illegible]	85
[illegible]	11	[illegible]	11
Aola	04½	Lexington	21½
Anaconda Cons	04¾	Magnet Rock	05½
Argentum Juniata	35	[illegible]	32
Bankers	05¼	Montreal	10½
Banner	04¾	Mountain Beauty	00½
Bob Lee	00¾	Mollie Gibson	37
Creede & C. C.	13	Moon-Anchor	73½
Cripple Cr'k Con	15¾	Mount Rosa	30½
Dante	10½	New Haven	07½
Des Moines	06¼	Oriole	06½
Elkton Con	1 17	Orphan	10½
El Paso	41	[illegible]	08
Emma Almee	02½	Pilgrim	07
Fanny B	04¼	Portland	2 45
[illegible]	05	[illegible] Albert	04½
Findley	17	Rattler	07½
Fl'wer of the W'st	04½	Specimen	13½
[illegible] Fleece	28	[illegible]	08
[illegible] & Globe	05	[illegible]	07
Gold King	84	Union	22½
[illegible]	30	Vindicator	1 49
Granite Hill	07½	Work	23½

SALT LAKE CITY

Anchor	50	Joe Bowers [illegible]	06
Ajax	08	La Reine	60
Alliance		Lower Mammoth	30
Alice	40	Little Pittsburg	02½
Bullion Beck	2 05	Mammoth	3 10½
Buckeye		Mercur	8 93
Cent. Eureka	80 00	May Day	01
Chloride Point	25	Northern Light	14½
Congor	25	North Swansea	—
Daly	1 41	Omaha	13
Daly West	12 73	Ontario	8 20
Dalton & Lark	03	Petro	40
Dalton	01	Rich Anaconda	20
Dexter	3 45	Sunshine	30
Daisy	10½	Swansea	3 92½
Eagle	03½	So. Swansea	1 25
Eagle & Blue Bell	1 45	Sunbeam	07½
Emerald	12	Sacramento	40
Four Aces	13½	Silver King	45 00
Geyser Marion	31	Star Consolidated	13
Galena	30	Shower Con	38
Grand Central	5 50	Tetro	05
Golden Eagle	01	Utah	60
Horn Silver	1 17½	Valeo	05
Homestake	04½	West M't'n Pl'cer	11
Ingot	08	Yankee Con	19½
Joe Bowers	17		

NEW YORK

Adams Con	12	Isabella	82½
Alamo	09½	Iron Silver	55
Alice	60	Jefferson	10
Alliance	—	Jennie Blanche	—
[illegible]	90	[illegible]	
Anaconda Gold	44½	King & Pemb	10
Anchoria L.	60	Leadville Cons	08
Argentum Juniata	24	Little Chief	19
Belcher	30	Mexican	25
Best & Belcher	45	Mollie Gibson	37
Bust Gold		Mt. Rosa	
[illegible]	1 55	[illegible]	15
[illegible]	27	[illegible]	1 50
Chollar	25	Ophir	90
Chrysolite		Phoenix [illegible]	09
[illegible] Tunnel	04	[illegible]	19
Comstock Stocks	04	Plymouth	38
Comstock Script	04	Portland	1 05
Con. Cal. & Va.	1 75	[illegible]	19
Cr. & Cr. Creek	11	[illegible]	1 50
Crescent	15	Quicksilver pfd	3 50
Crown Point	12	Rocky Mountain	
Cripple Creek Con	18	San Juan Star	
Deadwood Terra	70	Savage	24
[illegible]	1 10	Sierra Nevada	70
Enterprise	—	Small Hope	1 75
Good Samaritan		Specimen	10
[illegible]	2 10	Standard Con	3 20
Gold Coin Gilpin	—	Syndicate	—
Golden Fleece	37	Union Con	30
[illegible]	30	[illegible]	32
[illegible]		Utah Con	10
Hale & Norcross	38	Union Gold	—
[illegible]		[illegible]	
Homestake	65 00	Work	30
Horn Silver	1 25	Yellow Jacket	25

SPOKANE, WASHINGTON.

Ben Hur	15	Mountain Lion	1 00
Black Tail	14	Morrison	—
Butte and Boston	05¼	[illegible]	
Cariboo	—	Pearl	11
Deer Trail No. 2	22	Princess Maude	11
Golden Harvest	04	Quilp	12
Insurgent	04	Rebate	—
Iron Monitor	—	Republic	90
Jim Blaine	31	San Poil	—
Liberty	—	Tom Thumb	17
L. Pine Surp. Con	12	Winipeg	—
Morning Glory	11½		

DENVER STOCK REPORT

Aetna	—	Keystone	11½
Anchoria Leland	70	[illegible]	
Anaconda	44 60	Matoa	37½
Arcadia	04½	Mollie Gibson	37
Argentum Juniata	25¼	Moon Anchor	73
Banner	04½	Mt. Rosa	30½
Bob Lee	00¾	Old Gold	—
[illegible]	17	[illegible]	
El Paso	41½	Pilgrim	07½
Enterprise	17½	Pine Creek	—
Fanny B	00½	Portland	2 45
Garfield	15½	Prince Albert	04
Gr. Washington		[illegible]	11
Golden Eagle		Sacramento	20
Gold Coin	2 10	Smuggler	
Globe & C. C.		[illegible]	
[illegible]	—	[illegible]	
Golden Fleece	28	Union	7
Isabella		[illegible]	
[illegible]	08	[illegible]	
[illegible]	65	[illegible]	9

MEXICO

Name of Company	State	[illegible]
[illegible]	Hidalgo	29
[illegible]	[illegible]	200
[illegible]	[illegible]	200
[illegible]	[illegible]	100
[illegible]	[illegible]	60
Bartolomé de Medina	Hidalgo	00
Cabezon y An	Zacatecas	15
[illegible]		100
[illegible]	[illegible]	50
Carmen	Hidalgo	400
[illegible] Sanchez y An	[illegible]	350
Concepcion y Anexas	S. Luis Potosi	200
Coronas	Mexico	75
El Oro	Guanajuato	30
El Oro, pref	[illegible]	50
[illegible] y An	[illegible]	400
[illegible]	[illegible]	50
Guadalupe	Guanajuato	125
Luz de Borda Aviado	Michoacan	30
Luz de Borda aviado	Michoacan	
Luz de Maravillas	Hidalgo	120
[illegible]		20
Palma de Somb	Zacatecas	00
[illegible]	[illegible]	1,000
Rafael y Annexas	Hidalgo	1 020
Real del Monte	Hidalgo	800
Restauradora	Durango	20
Rosario y Annexas	Durango	10
San Francisco	Hidalgo	105
San Rafael aviado	Hidalgo	410
San Rafael del Oro	Hidalgo	70
Sta. Maria de la Paz	S. Luis Potosi	140
Soledad	Hidalgo	120
Sorpresa	[illegible]	100
Trinidad Aviador	[illegible]	50
Trinidad Aviado	[illegible]	10
Tlauzingo	Puebla	20
Union Hacienda	Hidalgo	100
Zona Min. de Paz	[illegible]	40

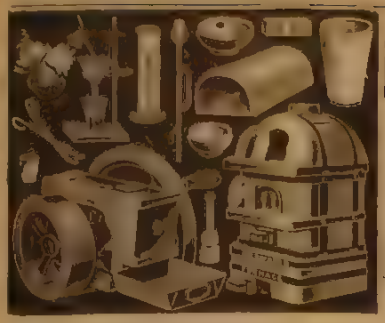
NOTE. The above Mexican stocks are figured on the basis of Mexican silver.

INCORPORATED MINES PAYING DIVIDENDS.

	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mines Is Produced
1	Aetna Cons	California	100,000	500,000	$ 5	$ 10	Oct 1899	$ 195 000	Q.
2	Alamo	Utah	125,000	125,000	1	02	April 1899	2,500	G, C, I.
3	Alaska, Treadwell	Alaska	200,000	5,000,000	25	37½	July 1899	4,145 000	G.
4	Alaska Mexican	Alaska	200,000	1,000,000	5	10	July 1899	411,031	G.
5	Anaconda Copper	Montana	1,200,000	30,000,000	25	2 00	Nov 1899	12,150,000	C.
6	Anchoria Leland	Colorado	600,000	600,000	1	03	Apr 1899	198,000	G.
7	American Gold	Colorado	300 000	3,000,000	10	09	June 1899	434,000	G. S. L
8	American Coal	Maryland	60,000	1,500,000	25	1 25	Sept 1899	727,500	Coal
9	American Zinc, Lead and Smelting	Missouri	200,000	500,000	25	10	Oct 1899	40,000	Z, L.
10	Aurora	Michigan	100,000	2,500,000	25	50	June 1899	890,000	I.
11	Argonaut	California	200,000	2,000,000	10	10	Aug 1899	340,000	
12	Bald Butte	Montana	250,000	250,000	1	06	Sept 1899	747,141	G, C. S.
13	Bonanza Development	New Mexico	300,000	3,000,000	10	3 50	June 1899	1,500,000	
14	Boston & California	California	600,000	600,000	1	06	June 1899	72,000	
15	Boston and Colorado Smelting	Colorado	15,000	750,000	50	5 00	April 1899	375 000	
16	Boston & Montana Con.	Montana	150,000	3,750,000	25	10 00	Aug 1899	12,275,000	G, C, S.
17	Breece	Colorado	200,000	5,000,000	25	05	Sept 1899	60,000	I.
18	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Sept 1899	2,408 300	G, S.
19	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	May 1899	705,000	S. L.
20	Cariboo	British Col	800,000	800,000	1	01½	Feb 1899	248,965	G.
21	Calumet & Hecla	Michigan	10,000	2,500,000	25	20 00	Sept 1899	64,850,000	C.
22	Centennial Eureka	Utah	30,000	1,500,000	50	50	Aug 1899	2,150,000	S. L.
23	Central Lead	Missouri	10,000	1,000,000	100	50	Sept 1899	127,000	L.
24	Charleston	S. Carolina	10,000	1,000,000	100	2 00	June 1899	200,000	
25	Colorado Smelting	Montana	100,000	1,000,000	10	1 00	Jan 1899	1,945,000	G, S, C.
26	Consolidated Tiger and Poorman	Idaho	1,000,000	1,000,000	1	02	Dec 1898	20,000	G, S.
27	Creston Leasing	Colorado	1,000,000	1,000,000	1	01	Dec 1898	54,000	
28	Crowned King	Arizona	600,000	6,000,000	10	02	Dec 1898	232,000	G, S, L.
29	De Lamar	Idaho	400,000	2,000 000	5	12	May 1899	2,346,000	G, S.
30	Deer Trail No. 2	Washington	1,000,000	1,000,000	1	25	Sept 1899	40,000	
31	Doe Run	Missouri	5,000	500,000	100	50	Sept 1899	85,000	L.
32	Empire State Idaho	Idaho	75,000	750,000	10	30	Sept 1899	229,375	
33	Fanny Rawlings	Colorado	1,000,000	1,000,000	1	01	Aug 1899	20,000	G, S.
34	Ferris-Haggerty	Wyoming	1,000,000	1,000,000	1	00½	Mar 1899	5,000	C, G, S.
35	Garfield Consolidated	Colorado	1,200,000	1,200,000	1	01	May 1899	34,000	G.
36	Golden Star	Ontario, Canada	100,000	100,000	1	01	July 1899	41,000	
37	Gold Coin of Victor	Colorado	1,000,000	1 000,000	1	01	Sept 1899	240 000	G.
38	Gold King	Colorado	1,000,000	1,000,000	1	03	July 1899	60,000	G.
39	Golden Cycle	Colorado	200,000	1,000 000	5	05	Sept 1899	228,500	
40	Grand Central	Utah	250,000	250,000	1	24	Sept 1899	666,250	G, S, C, L.
41	Gwin	California	20,000	1,000 000	50	25	Aug 1899	31,500	G.
42	Grass Valley Exploration	California	50,000	100,000	2	25	July 1899	12,500	
43	Helena and Frisco	Idaho	500,000	2 500,000	5	25	June 1899	550,000	S, L.
44	Highland	S. Dakota	100,000	10,000,000	100	20	July 1899	3,924,718	G.
45	Holy Terror	S Dakota	300,000	300,000	1	01	July 1899	142,000	G.
46	Homestake	S. Dakota	125,000	12,500,000	100	50	Sept 1899	7,828,750	G.
47	Horn Silver	Utah	400,000	10,000,000	25	05	July 1899	5,270,000	S, L.
48	Idaho	British Col	500,000	500,000	1	05½	Jan 1899	292,000	
49	Isabella	Colorado	2,250 000	2,250,000	1	01	Sept 1899	472,500	G.
50	Jack Pot	Colorado	1,000,000	1,000,000	1	04	Sept 1899	75,000	G.
51	Jamison	California	390,000	3,900,000	10	10	April 1899	50,700	
52	Lake Superior Iron	Michigan	84,000	2,100,000	25	1 00	Feb 1899	736,000	I.
53	Lillie	Colorado	1,000,000	1,000,000	1	05	Sept 1899	279,110	G.
54	Modoc	Colorado	500,000	500,000	1	02	Sept 1899	170,000	G.
55	Montana Ltd	Montana	660,000	3,300,000	5	12	Apr 1899	2,997,557	G, S.
56	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	Sept 1899	1,280,000	
57	Morning Star	California	2,400	240,000	100	3 00	Sept 1899	744,600	G.
58	Mercur	Utah	200,000	5,000,000	25	12½	July 1899	1,291,000	G.
59	Mammoth	Utah	400 000	10,000,000	25	15	Sept 1899	1,530,000	G, S, C, L.
60	Mead	California	2,000,000	2,000,000	1	20	June 1899	120,000	G.
61	Monument	Colorado	300,000	300 000	1	01	Dec 1898	12 624	
62	Moulton	Montana	400,000	2,000,000	5	05	Feb 1899	480,000	
63	Mt. Shasta	California	20 000	100,000	5	30	May 1899	6,000	
64	New York & Hon. Rosario	Central A	150,000	1,500 000	10	10	Sept 1989	1,110,000	S, G.
65	Napa Cons	California	100 000	700,000	7	30	Oct 1899	1,040,000	Q.
66	New Idria Quicksilver	California	100,000	500 000	5	30	Oct 1899	170,000	Q.
67	North Star	California	200,000	2,000,000	10	25	Apr 1899	550,000	G.
68	Original Empire	California	50,000	5,000,000	100	1 00	May 1899	500,000	G.
69	Osceola	Michigan	50,000	1,250,000	25	3 00	June 1899	2,801 500	C.
70	Parrot	Montana	230,000	2,300,000	10	1 50	May 1899	2,690,898	C.
71	Pennsylvania Consolidated	California	51,500	5,150,000	10	20	Sept 1899	105,575	
72	Pioneer	California	100,000	1,000,000	10	12½	Mar 1899	62,500	G.
73	Portland	Colorado	3,000,000	3,000,000	1	02	Sept 1899	2,347,080	G, S.
74	Plumbago	California	300,000	300 000	1	15	Jan 1899	45,000	G.
75	Quicksilver Pref	California	43,000	4,300,000	100	50	May 1899	1,845,411	Q.
76	Quicksilver Consolidated	California	57,000	5,700,000	100	40	July 1899	643,867	Q.
77	Quincy	Michigan	100,000	2,500,000	25	6 00	August 1899	11,070,000	C.
78	*Republic Consolidated	Washington	3 000,000	3,000,000	1	01	Sept 1899	323,000	G.
79	Rambler-Cariboo	British Col	1,000,000	1,000,000	1	01	April 1899	50,000	
80	Royal Consolidated	British Col	2,500,000	2,500,000	1	01	June 1899	1,050,000	G.
81	Sacramento	Utah	1,000,000	5,000,000	5	00½	Sept 1899	133,000	G.
82	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Feb 1899	3,325,000	S.
83	South Swansea	Utah	150,000	150,000	1	05	Sept 1899	150 000	S, L.
84	Standard	Idaho	500,000	500,000	1	08	Apr 1899	1,745,000	G, S
85	Standard Consolidated	California	200 000	20,000,000	100	10	Aug 1899	3,879,226	G, S.
86	St. Joseph	Missouri	30,000	3,000 000	10	50	June 1899	2,859,500	L.
87	Silver King	Utah	150 000	3,000,000	20	25	Sept 1899	2,250,000	S, L, G.
88	Smuggler	Colorado	1,000,000	1,000 000	1	01	Sept 1899	1,185,000	S, L, Z.
89	Swansea	Utah	100 000	500,000	5	05	Oct 1899	241,000	S. L.
90	Tamarack	Michigan	60,000	1,500,000	15	4 00	June 1899	5,910,000	C.
91	Tomboy	Colorado	200,000	2,000,000	10	4 00	May 1899	730,000	G.
92	Utah	Utah	100,000	1,000,000	10	02	Jan 1899	179,000	G.
93	Vindicator Consolidated	Colorado	1,500,000	1,500 000	1	05	July 1899	253,750	G.
94	War Eagle Consolidated	British Col	2,000,000	1,000,000	1	01½	Sept 1899	414,000	
95	Wolverine	Michigan	60 000	2,500,000	25	1 50	Oct 1899	270,000	C.
96	Yellow Aster	California	100,000	1,000,000	10	10	Sept 1899	253,789	G.

S. Silver; G. Gold; L. Lead; C. Copper; Q. Quicksilver; I. Iron Z. Zinc.

N. B.—Companies not listed paid nothing in the last twelve months. *Paid since consolidation, $203,000; Republic paid $120,000 under old management.



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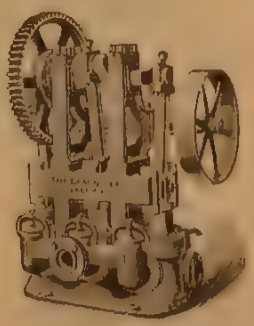

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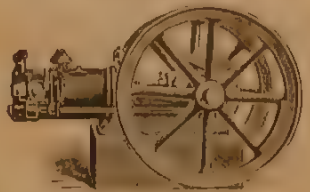

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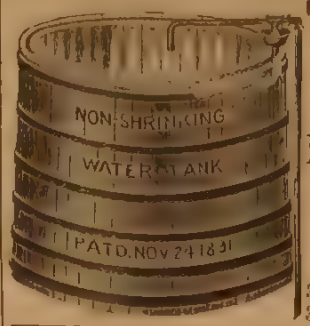

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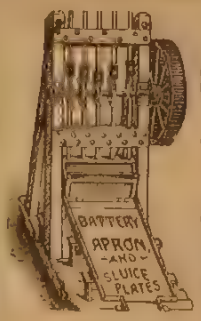

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